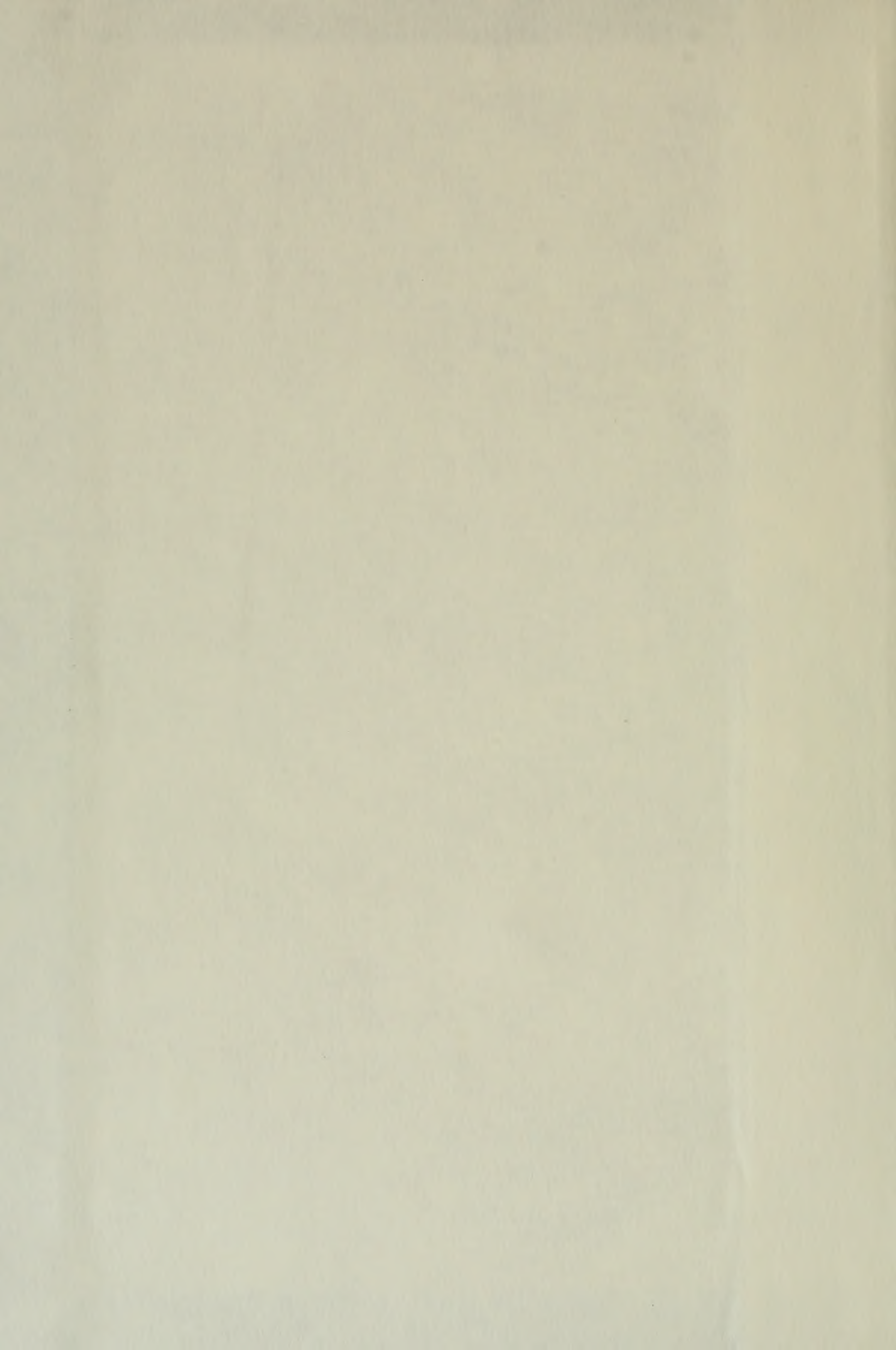
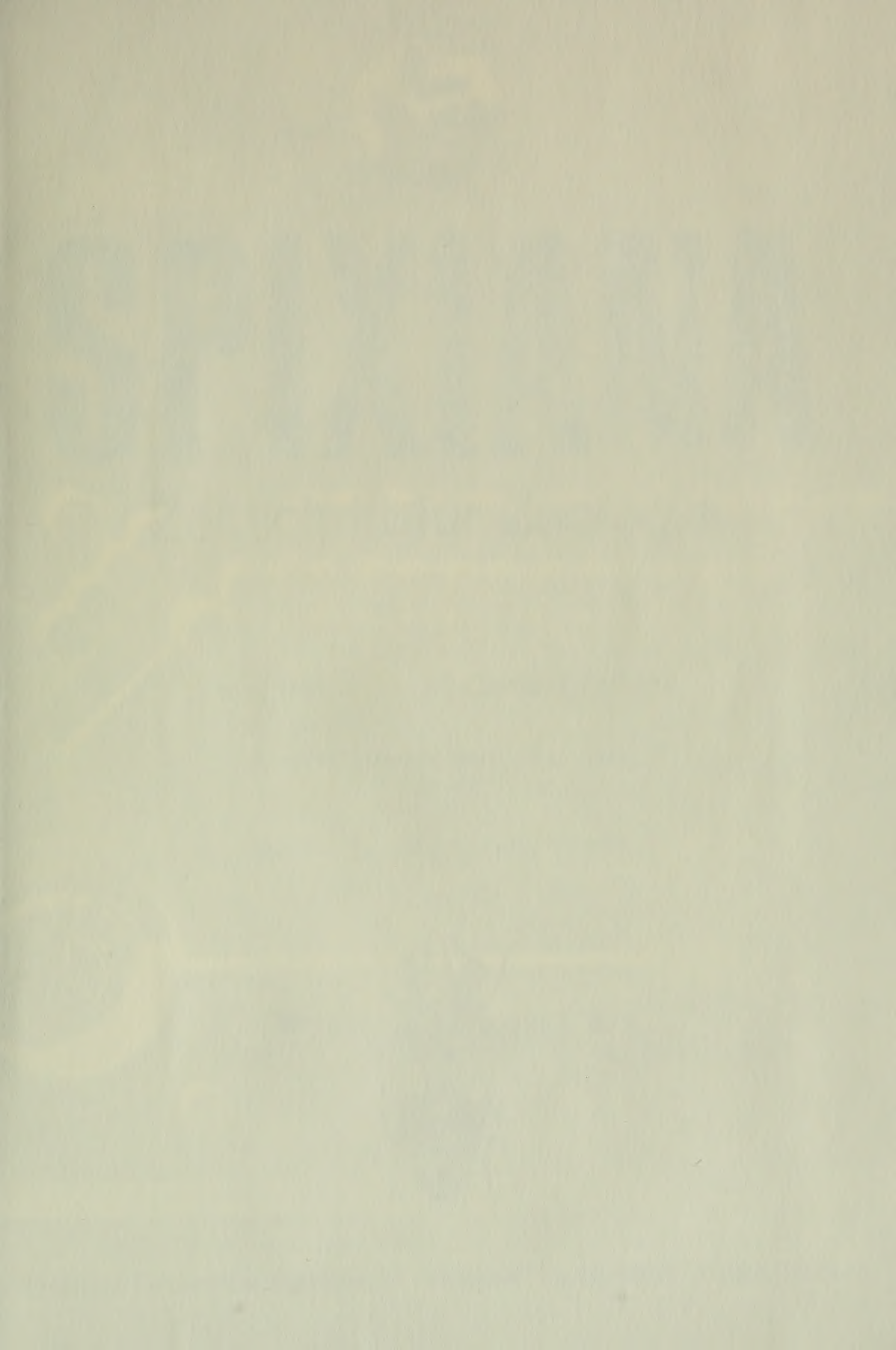











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# The Flesh-Flies of Central Europe

## (Insecta, Diptera, Sarcophagidae)

Dalibor Povolný & Yuriy Verves




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# The Flesh-Flies of Central Europe

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**Dalibor Povolný & Yuriy Verves**

Povolný, D. & Y. Verves (1997): The Flesh-Flies of Central Europe (Insecta, Diptera, Sarcophagidae). – Spixiana Suppl. **24**: 1-260

The present publication is the first attempt to review the central European taxa of the family Sarcophagidae or flesh-flies. More than 150 species of the family are known to occur in this area, a number of which is representative for central Europe, and no essential changes in number of taxa are to be expected in future. The paper comprises information on nomenclature and synonymy, classification and phylogeny, morphology, relation to hosts, ethology of adults, flesh-fly taxocenoses, forensic importance of flesh-flies and, finally, a review of all taxa distributed in the individual countries of central Europe. Chapters on the flesh-fly taxocenoses and on the forensic importance of the flesh-flies are published for the first time in Sarcophagidae literature. Most important morphological characters of adults including male and female genitalia are illustrated.

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## Introduction

The Sarcophagidae, known as flesh-flies because many of them feed on the soft tissue of animal bodies, is a species-rich family of calyptrate Diptera comprising some 2.500 described species distributed worldwide. In general appearance the adult flies are grey and black, chequered or spotted (Plates XI, XII; Figs 89, 90, 95, 97), elongate, robust and (conspicuously) bristled. It is a family in which many of the flies habitually deposit live larvae instead of eggs. The larvae are distinctive structurally in having the hind spiracles hidden in deep pits with the spiracular slits nearly vertical.

Flesh-flies have attracted considerable interest since they perform a particular though unobtrusive practical regulatory function in the general ecosystem. Many of the species exist by breeding in faeces and obligatory parasitism. Some are synanthropic or culturophile destructors of organic substrates responsible for passive vectorship of various pathenogenic agents. Some species, notably of the genus *Wohlfahrtia,* cause myiasis in man and animals. Miltogrammatinae larvae are inquiline parasites in the nests of aculeate hymenopterans, including the honey bee by the species *Senotainia tricuspis,* and sometimes seriously deplete local bee populations. Some species have predaceous or parasitoid larvae that prey on other insects, particularly lepidopterous larvae and orthopterans.

The Sarcophagidae present a representative model group for the study of trophic relations between their feeding strategies and their transition to predation and parasitism, including morphophysiological adaptions to ovolarviparity, and intraintestinal and extraintestinal digestion in larvae. They are also useful as bioindicators of environmental disintegration.

In central Europe the purely faunistic aspect of the Sarcophagidae has been relatively well explored. One of the first papers on faunistics and ecology involving the Sarcophagidae of this part of Europe was by Jacentkovskij (or Jacentkovský) (1941), who had emigrated from the Soviet Union (now Russia) to Czechoslovakia (now Czech Republic and Slovakia) and worked in the Faculty of Forestry of the Agricultural University in Brno. He was motivated like many others in having available the comprehensive work on Diptera by the eminent Russian entomologist Boris B. Rohdendorf (1937). It was only in the 1950's, when Europe was recovering from the depredations of World War II, that a true outburst of papers followed, starting with those by Čepelák (see references) and his student Slamečková (1952-1972). A wider interest in the flesh-flies arose as more became known of their practical importance, especially in the context with various aspects of hygiene, epidemiology, veterinary and human medicine, in the complex of the so-called synanthropic flies. Studies in Czechoslovakia by Gregor and Povolný (1958-1964) led to their participation in the internationally important book on this subject by Greenberg et al. (1971).

The present study is an attempt to review and up-date our knowledge taxonomically, faunistically and biologically of the Central European taxa of flesh-flies. It is to a large extent the result of field observations carried out by the authors over a number of years and the examination of many hundred thousands of flies both in nature and in the laboratory. Though centred mainly on work in the Czech Republic and Slovakia it covers neighbouring countries to a lesser or greater extent. The available literature on flesh-flies found in central Europe includes papers by the following authors: Čepelák, Jacentkovský, Povolný (1960-1990), Povolný & Šustek, Povolný & Znojil, Slamečková, Šustek, Vácha and Znojil (Czech Republic and Slovakia), Draber-Moňko (Poland), Mihályi (Hungary) (see references), and Verves (Germany, Austria) (see references). After 1989 possibilities arose to compare aspects of central European Sarcophagidae and their relation especially to the Mediterranean region (e.g. Povolný 1991, 1992, Povolný & Znojil 1994).

At present more than 150 species of Sarcophagidae are known from central Europe. These undoubtedly represent more than 90 % of the sarcophagids occurring in this territory. Some additional faunistic discoveries might be expected especially in neighbouring alpine habitats (Austria and Bavaria) and also in Hungary because of its transitory connection with the Mediterranean region. Further, the Slovak Carpathians may yield not only purely Carpathian but also invasive east European species.

The present publication is the result of 45 years effort in studying various aspects of the existence of flesh-flies. It was initiated by the late Professor B. B. Rohdendorf, Moscow, who is reckoned among the leading authority of flesh-fly studies on a world-wide scale. Therefore, this study continues his endeavour in the field of entomology.

## Nomenclature and Synonymy

The nomenclature and synonymy used in this study follows the Catalogue of Palaearctic Sarcophagidae (Verves 1986) which also reflects the recent state of taxonomy and phylogeny of this family (with minor adaptations). The synonyms presented in this paper are generally limited to names frequently used (in the past) mostly for practical reasons (e.g. species of sanitary importance or important insect parazitoids) or they represent recently discovered synonyms not yet published in the above catalogue by Verves (1986). The complete synonymy of the central European Sarcophagidae results, thus, from this paper and from the synonyms presented by Verves (1986).

## Classification and Phylogeny

The following classification is based on the opinions of Rohdendorf, especially on his ideas published in 1967, and Lopes (1982). Some adaptions were proposed by Verves (1987c, 1988, 1989a, 1990b). Rohdendorf (1977) treated the family Sarcophagidae as an evolutionary branch of the superfamily Tachinoidea. Rognes (1986) and Pape (1992a) took the following characters as autapomorphies of this family:

1. Abdominal sternite II overlapping margins of abdominal tergite I+II.
2. Absence of discal (alpha) abdominal setae.
3. Reduction and perpendicular position (towards medial plate) of male "bacilliform" sclerites.
4. Bilobate ventral pouch of female uterus.
5. Deposition of embryonic eggs or prehatched 1st instar larvae.
6. Incomplete peritreme of posterior spiracle in 2nd and 3rd instar larvae and its indistinct ecdysial scar.
7. Posterior spiracles of 2nd and 3rd instar larvae situated in a depression.
8. Presence of parastomal bars in 3rd and 4th instar larvae.
9. Reduced sclerotizaton of central paraphallus portion.
10. Posterior incision in dorsal corner of cephalopharyngeal skeleton of 3rd (and possibly 2nd) instar larvae.
11. Prothoracic spiracular horn not protruding from puparium.
12. Presence of beta-anyl-l-tyrosine ("sarcophagine") in larval haemolymph.

The mutual relationship between tachinoid families was analysed by Pape (1992a).

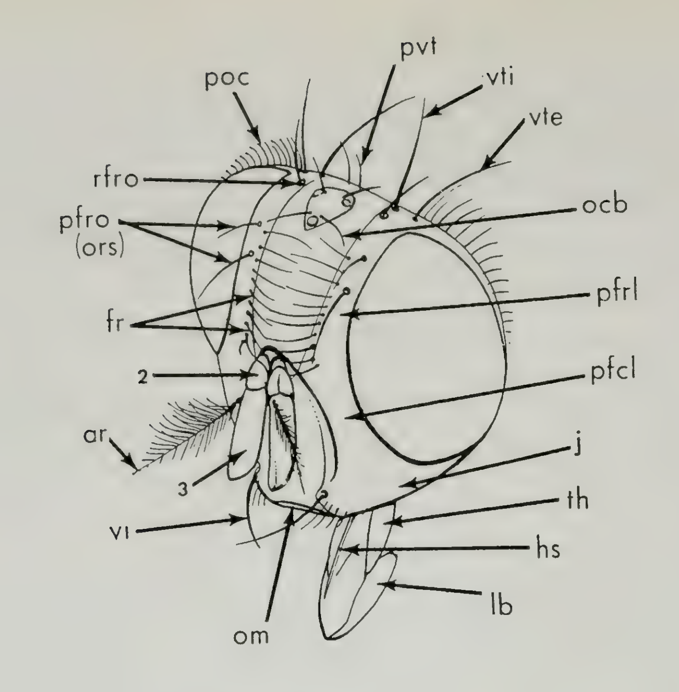
## Morphology

The well developed labial palpus in these species with a medium-length proboscis is believed to be a plesiomorphic character. A shorter palpus in species with elongate or shorter proboscis or the reduction of the palpus *(Africasiomyia)* is considered to be a specialized situation; a strong and broad palpus is an apomorphic character (Lopes 1984).

Mid-sized dichoptic eyes and parallel-sided frontal vitta (wider moderately forwards and backwards) (Figs 86-88, 109) is probably a plesiomorphy; subholoptic eyes, narrowed frontal vitta (in males of Sarcophagini) or wider frons including wide frontal vitta (e.g. in *Miltogramma*) are probable apomorphies. In some instances frons is wide, but vitta frontalis is very narrow and parallel-sided *(Synorbitomyia)*, which seems to represent also an apomorphic modality.

The head chaetotaxy (Plate I) shows important diagnostic (identification) characters for species, subgenera and genera, especially within Miltogrammatinae. The presence of postorbital (postocular) setae is characteristic of all Sarcophagidae, but in specialized taxa these setae may be regularly uniordinate. The reduction numerically of setae and bristles or their small size (e.g. proclinate orbitals in most males of Sarcophaginae) seems to be an apomorphic character. It appears that such reduction is combined with the loss of certain sensorial functions.

The head coloration (Figs 86-90, 95, 97) is rather variable, but can be useful for identification of species, less often of subgenera and genera (Verves 1979c). Head chaetom (Fig. 109) is usually black.



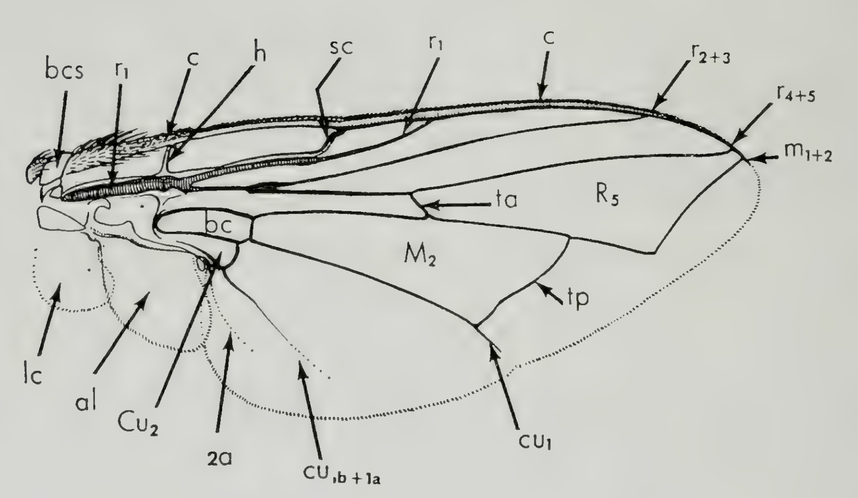
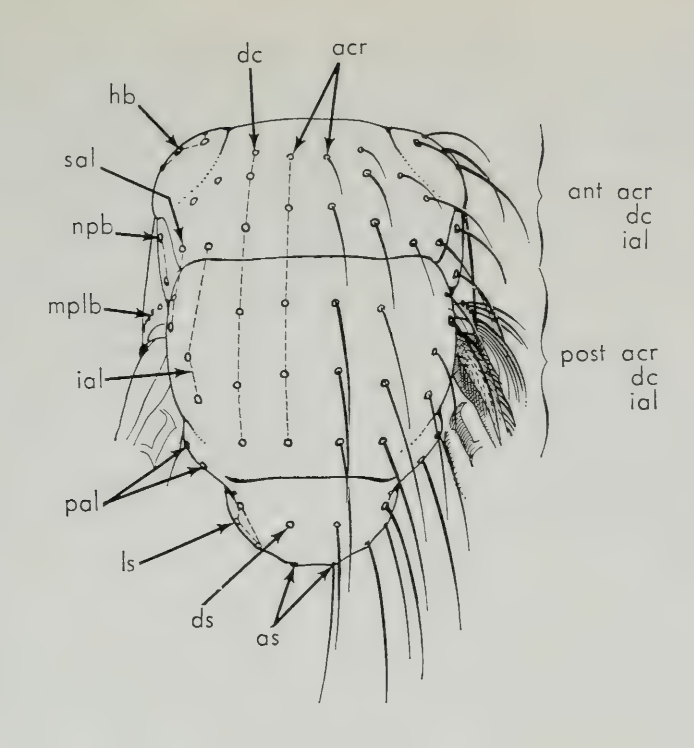




**Plate I**

Chaetotaxy of head (fronto-lateral view). **ar**, arista; **fr**, frontals; **hs**, haustellum; **j**, jowls; **lb**, labella; **ocb**, ocellars (ocellar, ocular) bristles; **om**, oral margin; **pfc**, parafacial; **pfrl**, parafrontal; **pfro(ors)**, proclinate fronto-orgitals; **poc**, postocellars; pvt, postverticals; **rfro**, reclinate fronto-orbitals; **th**, theca; **vi**, vibrissae; **vte**, external verticals; **vti**, internal(interior) verticals; **2**, **3**, 2nd and 3rd antennomere.

Forewing (dorsal view). **al**, alula; **bc**, basal cell; **bas**, basicosta; **c**, costa; $\mathbf{cu_1}$, $\mathbf{cu_2}$, cubital veins; $\mathbf{Cu_2}$, cubital (anal) cell; $\mathbf{cu_{,b+1a}}$, anal vein; **h**, humeral (cross) vein; **lc**, lower squama(calyptra); $\mathbf{m_{1+2}}$, medial vein; $\mathbf{M_2}$, medial (discal) cell; **sc**, subcosta; **ta (r-m)**, anterior cross or m-vein; **2a**, analvein (redrawn from Gregor, in: Greenberg et al. 1971).



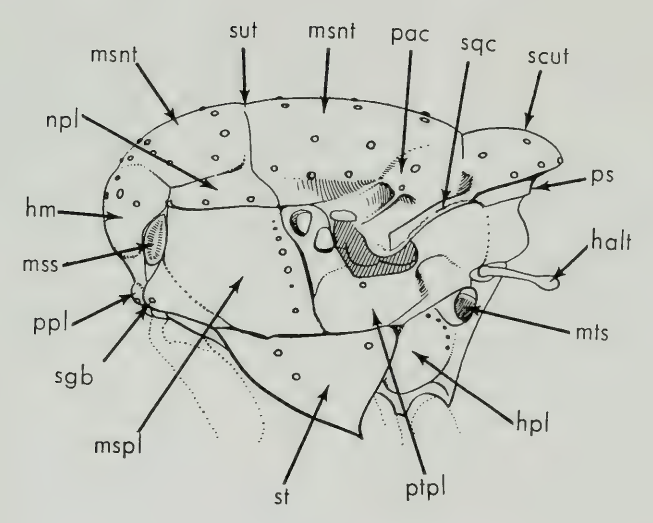




**Plate II**

Thoracic chaetotaxy (dorsal view). **acr**, acrostichals; **as**, apicoscutellars; **ds**, discoscutellars; **dc**, dorsocentrals; **hb**, humerals; **ial**, intra-alars; **ls**, latero-scutellars; **mplb**, mesopleurals; **npb**, notopleurals; **pal**, postalars; **sal**, supraalars.

Thoracic chaetotaxy (lateral view). **halt**, halter; **hm**, humerus; **hpl**, hypopleuron; **msnt**, mesonotum; **mspl**, mesopleuron; **mss**, anterior (mesothoracic) spiracle; **mts**, posterior (metathoracic) spiracle; **npl**, notopleuron; **pac**, postallar callus; **ppl**, propleuron; **ps**, postscutellum; **ptpl**, pteropleuron; **scut**, scutellum; **sgb**, stigmatic bristle; **sqc**, supra-squamal carina; **st**, sternopleuron (with position of sternopleurals 2:1); **sut**, suture (redrawn from Gregor in Greenberg et al. 1971).

The presence of white hairs on occiput and postgena (in most Sarcophaginae) combined with black coloration of setae or the entire change of originally black setae into bright setae is an obvious apomorphy (in Miltogrammatinae). The species of *Nyctella* (Rohdendorf & Verves 1980) and in some species of *Afrosenotainia* (Verves 1979d) show a specialized chaetom consisting of inflated strong white bristles (apomorphy). Parafrontal and parafacial are usually silvery grey dusted, but this pruinescence might be golden or yellow (lustrous) in specialized forms (Kurahashi & Kano 1984); and sometimes the head is lustrous black with a pair of bright silver spots in the upper part of the postfrontal *(Liosarcophaga seyshellica)* (Verves 1986c), or completely black (in some *Hoplocephalina*). The coloration of antenna and palpus can vary from black to brownish red or even yellow within a single species, but in other cases the coloration is species-specific. Bright coloration of antenna and palpus seem to represent an apomorphic modality.

The absence of sexual dimorphism is characteristic of generalized groups of the subfamilies Macronychiinae, Miltogrammatinae and Paramacronychiinae. In the majority of Sarcophaginae the ♂ frons is distinctly narrower and proclinate orbital bristles are absent. The proclinate orbital bristles are present in some Neotropical tribes – in all Sarothromyiini and in some Johnsoniini: in *Leucomyia* (Sarcophagini) the ♂ frons is very broad, but the proclinate orbitals are absent. In some Miltogrammatinae (e.g. *Metopia, Sphenometopa)* the ♂ frons shows usually very bright metallic silvery or golden pruinescence, sometimes with a dark pattern (in *Sphenometopa kovalevi*) (Verves 1987). Eyes are usually reddish brown, but in some specialized Miltogrammatinae (partly in *Apodacrina*) they show a green hue. This eye colouration is present also in one of the generalized tribes – the Microcerellini (Lopes 1969).

The thorax and its structures are practically little used in taxonomy of supraspecific taxonomy of flesh-flies (see also Rohdendorf 1967), although it has certain importance for considerations on specialization of species and higher taxa including specific taxonomy. Marina (1988) demonstrated the general structural monotony of cervical sclerites and of prothorax in different sarcophagine taxa. On the other hand, the thoracal sclerites show sometimes apomorphic status: In the tribe Emblemasomatini the prosternum is enlarged (Lopes 1982, Shewell 1987). Unlike other sarcophagids the cover absence of hind spiracle (a plesiomorphy) is characteristic for Macronychiinae (Rognes 1986).

Thoracic chaetom (Plate II) consisting of elongate bristles and of short setae shows a tendency towards reduction. On the other hand, the development of setae in different sclerites is possibly apomorphic, since their presence increases the sensorial functions. This setisation of sclerites occurs in different systematic groups and is obviously evolutionary independent. The setose propleuron is known in miltogrammatines *(Senotainia – Chaetometopia)* and in *Austrometopia* (Malloch 1930), in Paramacronichiinae *(Dexagria, Eurychaeta)* (Verves 1980, 1982) and in sarcophagines (a number of species of Sarcophagini – in the subtribes Phytosarcophagina, Phallantina, Parasarcophagina, Boettcheriscina (Rohdendorf 1937, 1965, Zumpt 1972, Verves 1989b, c, 1983 etc.) and in Johnsoniini (*Notochaetina* – Lopes 1984). The presence of two strong notopleural bristles seems to be plesiomorphic, but in many taxa several short additional setae are present. The acrostichal bristles are subjected to (strong) reduction and they can be entirely absent in some taxa (e.g. *Bercaea*). The apicoscutellar bristles can also be more or less reduced, especially in ♂ Sarcophaginae. The dorsocentral bristles show a plesiomorphy in postsutural number of 3-4 pairs of more or less equal length; their multiplication to 5-8 pairs appears to be an apomorphy. The anterosutural dorsocentral bristles are 1-4 paired, rather weak, and the first strong bristle is usually closer to the second than to the suture (Lopes 1984, Kurahashi & Kano 1984). This situation correlates probably with the specialisation and particular reduction of the dorsocentrals.

Thoracic chaetom is usually black (e.g. Figs 89-100). In *Nyctella* and in some species of *Afrosenotainia* the thorax is covered with thick black setae (probable apomorphy). White hairs combined with black setae are characteristic of Goniophytoini (Paramacronychiinae) and of Cuculomyiini (Sarcophaginae). Thorax is essentially black with more or less distinct grey "dust" and with three longitudinal black stripes on mesonotum. Especially in psammophilic taxa the bright pruinescence is often dense and the longitudinal stripes (striae) are reduced. In *Nyctia* (Paramacronychiinae), in some males of *Sphenometopa* and *Dolichotachina* (Miltogrammatinae) the thorax is lustrous black. Some species of *Notochaeta* show a metallic green hue on the thorax (Lopes 1984). In some Neotropical Macronychiinae (Verves 1983 b), in *Euboettcheria* (Townsend 1927), in numerous Oriental and Australian Sarcophaginae of the genera *Sarcorohdendorfia* (Lopes 1955), *Chrysosarcophaga* (Lopes & Kano 1978) etc. the thorax is densely golden pollinose. In Miltogrammatinae a golden thoracic coloration is typical. Such metallic colours seem to be apomorphic.

Sexual dimorphism in the thoracic structure is poorly developed. The mesonotal pruinescence is usually more dense in females. The chaetom in females is less developed, only the apical scutellar bristles are stronger than in males. In some *Miltogrammatina*, e.g. in *Dolichotachina, Sphenometopa, Mosomelaena*, the males show a partly or completely black mesonotum, whereas in females the mesonotum is grey.

The legs (Plate X, Fig. 10) show certain general and special taxonomical importance. This involves their proportions, chaetotaxy and coloration. According to Rohdendorf (1967) elongate legs with long and straight claws and pulvilli represent an adaptation to running (in Sarcophaginae and Paramacronychiinae). In Miltogrammatinae this kind of leg is considered "secondary and superfluous". But running in search after hosts etc. for larviposition is characteristic of all sarcophagid females. The males use mostly the wings as a device of communication. It seems that shortening of claws is a running adaptation, because long claws act inhibitorily when running and tend to "anchor" the legs. Our observations (Verves) indicate that elongate claws in the males are an adaptation for grasping the female during copulation or for gripping small stones etc. when sitting on the soil in preconnubial hilltopping situations. Short claws in males (possible apomorphy) occur mostly in Miltogrammatinae: all Senotainiina, Amobiini, Oebaliini, in *Taxigramma*, in some species of *Obsidia, Metopia, Lampometopia* and *Chrysogramma* (Paramacronychiinae). This situation relates probably to their mating: they perform complicated ritual "dances" on smooth objects (soil, stones, leaves) (Spofford & Kurczewski, 1989 and own observations). The female uses the whole tarsi and the specialized chaetom, unique to miltogrammatines.

The shortening of the tarsomeres, especially in males, shows importance in taxonomy: In some instances the elongate femora and tibiae show subtribal character *(Dolichotachinina)*. Pape (1987b) used the shape of mid-femoral organ (Plate IV) in taxonomy. This organ (studied by Assis-Fonesca 1953, Downes 1955) is an elongate ovate patch, usually reddish-coloured with diametrical lines, situated on posterior surface of mid-femur. It occurs in many species of Sarcophaginae. A similar organ is sometimes present on the femur, but is less distinct. Its function is possibly secretory (osmeterium). Its size, form, colour and situation seem to be reasonably constant in species, and possibly also in subgenera and genera.

The hind trochanters show usually elongate setae on the medial surface in both sexes. According to Pape (1987b), the males often have long or short setae on the ventromedial part of hind trochanters – a character of taxonomic importance.

The fore femur has complete rows of posterodorsal and posteroventral bristles, occasionally with a row of anterodorsal setae. The middle femur has a row of more or less strong anterior setae in the middle and a diagonal apical row of posterodorsal bristles, anteroventral and posteroventral setae are usually present basally, but sometimes weak or absent. Middle femur of *Sarcotachinella sinuata* has distinct golden hairs forming an elongate spot at 0.3-0.4 of anterior surface. The males of Paramacronachiini and of some Sarcophaginae often show an apical row of more or less shortened spinolate posteroventral bristles – the ctenidium. The hind femur has a complete row of anterodorsal bristles, anteroventral and posteroventral setae are mostly weak, and situated at basal half of femur, or absent. One anteroventral bristle is usually situated near apical third of hind femur.

The fore tibiae show the following apical setae: Strong dorsals and posteroventrals, more or less distinct anterodorsals and posterodorsals, last two setae absent. A row of weak anterodorsal setae is usually situated at basal 0.5-0.7. One or two posterior or posteroventral bristles are situated near middle or apically at 0.3-0.4. Middle tibia with one, rarely 2-5 strong anterodorsal bristles near middle and with single posterodorsal bristle at lower ad-bristle. A single anteroventral or ventral bristle is situated at apical 0.3-0.4. This bristle may be absent in males of some species. One or two posterior bristles are situated near the middle. The hind tibia shows 2-4 anterodorsal, posterodorsal and anteroventral bristles of different length near the middle.

♂ femora and partly tibiae in the majority of Paramacronychiini and Sarcophaginae with dense long or short hairs at ventral, anteroventral or posteroventral surface. The setae have possibly sensorial function.

A unique ctenidium exists on ♂ legs of *Xerophilomyia*, all femora and sometimes tibiae are covered with rows of flat spear-shaped dorsal and ventral bristles apically or on entire surface.

The chaetom of fore tarsus in males (e.g. Figs 20, 21, 32-38) of numerous miltogrammatine species is important in identification of species, genera and subtribes.

The development of specialized fore tarsal chaetom serves as receptorial specialization and it fixes the female during copulation. Its evolution is summarized as follows:

1. Extension of normal setae, mainly at apex.
2. Multiplication of setae.
3. New setal areas.

Such specializations can be simultaneous or they conform with structural changes of tarsomeres. These specializations occur independently in different taxa:

In *Phrosinella (Asiometopia)* species, in *Metopia italiana* etc. the 1st-4th tarsomeress show 1-3 elongate ad and pd-bristles. In other cases paired ad-bristles are placed more or less distinctly separate from the apex. The setae can be present on tarsomeres 1st-3rd or 4th: *(Anacanthothecum testaceifrons, Rohdendorfiella nartshukae, R. verum)*, tarsomere 2nd-4th *(Miltogramma taeniatum)*, tarsomeres 3rd-4th *(Rohdendorfiella stackelbergi)*. In some instances several long ad and pd-bristles are situated opposite to each other on 1st, 2nd, rarely 3rd and 4th tarsomeres (in *Sphenometopa/Asiaraba)* species. Several more or less elongate pd- or p-setae are often present on apical part of tarsomeres 1-4 (in *Miltogramma villeneuvei, Pterella convergens, Metopia grandii)* or on the whole surface of tarsomeres *(Hilarella, Paragusia, Metopia staegeri)*. In *Metopia campestris* tarsomeres 1-4 each bear a single apical p-bristle. These cases show the secondary extension and/or multiplication of chaetom.

Short dense erect setae may be present on anterodorsal, dorsal or posterodorsal surfaces of 2nd-5th tarsomeres *(Miltogramma brevipilum)* on 2nd-4th tarsomeres *(Miltogrammatidium chivae, Pediasiomyia pritykinae)*, on 3rd-4th tarsomere *(Miltogrammatidium rutilans)*. Setal multiplication is responsible for this phenomenon.

The presence of setal areas is combined with the changes (specializations) of the individual tarsomeres. The 1st tarsomere is wider ventrally with areas of dense erect hairs. These areas are brushy *(Sphenometopa* s.str. and *S. /Tarsaraba/* spp.), or they are situated on ventrobasal process like a ctenidium *(Sphenometopa /Arabiopsis/)*. The 2nd tarsomere is slender and covered with long dense setae *(Phrosinella/Euhilarella/)*, 3rd tarsomere normal, 4th tarsomere wider and possibly covered with numerous elongate ad and 1d setae *(Miltogrammoides maximum* and related species, *Pterella penicillaris, Rohdendorfiella stackelbergi)* or only with ad-setae *(Chaetapodacra rohdendorfi)*, 4th tarsomere is provided with a tuft of long flat ad-setae projecting between claws and a single elongate ad *(Miltogramma oestraceum* and related species) or a tuft of very long flat p setae projecting over leg tip, and with long anterior erect hairs *(Miltogramma punctatum* and related species). The 5th tarsomere of *Apodacra pulchra* bears several long flat setae dorsally, the original dorsal hairs of this tarsomere are secondarily elongate.

Legs in the majority of species greyish black, but in individual species the legs can be entirely or partly red or yellow – a character of taxonomical importance (obvious apomorphy).

Wings. The wing venation (Plate I) is important for both specific and supraspecific taxonomy. The wings show usually medium degree costalisation, but in the miltogrammatine genera *Nyctella* and *Taxigramma* all veins are strongly displaced towards the costa (possible apomorphy). The desclerotization (medial and cubital veins are situated in hind wing part) is known in *Phylloteles*. Cell $R_5$ is broadly open in the majority of species, but it is closed or petiolate in some species (possible apomorphy). This situation can show considerable variation within a species (e.g. in *Agriella, Miltogrammoides, Paramacronychia)*.

A strong costal spine is considered to be an apomorphic modality (Lopes 1984), but its complete reduction is probably a secondary process, too. It seems that medium-sized costal spine is usual. The medial vein angle is right or sharp in species with medium degree of costalisation, whereas it is obtuse in species with strongly costalised or decostalised wing venation (possible apomorphy). The basal medio-cubital vein is sigmoid or arched, or straight (secondary situation). Veins $r_1$ and cu are usually bare, rarely setose. Node $r_{4+5}$ is usually setose dorsally and ventrally.

Wing is usually hyaline without pattern, only individual species (e.g. Fig. 97) showing wing pattern. In species with dark body coloration the wing shows dark costal margin (e.g. *Nyctia halterata, Agria monachae,* some Heteronychiina, Phallanthina, Xanthopteriscina). In Palaeotropic genera *Aethianella* and *Kalshovenella* (Baranov 1941, Zumpt 1972) and in some species of *Boettcherisca* (Kurahashi & Kano 1984) the wing base is distinctly yellow or orange.

Another type of wing pattern arises from obscure membrane around vein r-m, at angle of m-vein and at basal m-cu vein (e.g. *Turanomyia* of Paramacronychiinae). In some Sarcophaginae *(Amharomyia)* a black spot develops around r-m vein, similar blackish spots appear around other transverse veins

(e.g.in Afrotropical *Dysysceloctis, Poecilometopa, Poecilophalloides* and in some Neotropical Lepidodexiina). The wing pattern in Sarcophaginae and Paramacronychiinae shows no relation to sexual dimorphism.

The wing pattern in Miltogrammatinae shows a different character and it is present only in males. Obscured costal wing margin is known in *Synorbitomyia* and in some species of *Phrosinella* etc. Isolated dark spots are situated in different parts of wing: on subcostal cell *(Captopteron*, some species of *Rohdendorfiella)*, near wing apex (e.g. *Sphecapatodes*). Rather complex pattern is known in many species of *Sphenometopa*. It consists of a large spot starting apically in cell $R_1$ and expands to vein $r_{4+5}$ or behind it. The dark coloration covers wing apex and extends over 2nd and 3rd sections of m-vein behind it, and also the wing base is darkened. A similar pattern is found in *Phylloteles*, but the medial spot reaches apically the angle of the m-vein, the apex of cell $R_5$, expanding over m-vein apically. In the Australian species of *Protomiltogramma* the fore part and wing base is entirely dark up to fusion of m- and c-veins apically, and reaches middle of cells $R_5$ and M distally *(P. cincta)*. Or a large dark spot is situated in the central part of the wing between costal and cubital vein *(P. mallochi, P. laticeps)*.

Basicosta is usually yellow, sometimes black. Basicosta colour is sometimes of taxonomic importance. Squama is usually white or whitish, but in some species, particularly in the genera *Angiometopa* and *Boettcherisca*, it has a yellowish brown hue. In some species (e.g. of *Amharomyia*) the margins of squama are covered with long dense hairs.

The anterior five abdominal segments form the "visible" abdomen, the posterior segments or terminalia form the postabdomen. The 1st and 2nd tergites are fused to form tergite 1+2. Sternite I is very narrow and is crescent-shaped. Sternites I-IV (in Sarcophaginae and partly in Paramacronychiinae) or only sternites I and II (in other groups) are overlapped by the corresponding tergites. In the ♂ sternite V shows a generalized form in Macronychiinae, Miltogrammatinae. Paramacronychiinae and partly in Sarcophaginae (Plates IX, X). It has a more or less deep excision in the centre of its hind margin. In *Protomiltogramma* its posterolateral angles are elongate forming narrow arms. In the tribes Johnsoniini, Sarcophagini, Raviniini and in some other sarcophagines the central part of the hind margin excision is broader, forming a "window". The lateral lobes on both sides of the window are provided with a "ctenidium" consisting of spinose bristles ("brush"), and the fore part of sternite V is elongate so that the sternite appears to be Y-shaped (Plate IX, Figs 10-19, Plate X, Figs 1-9). Sometimes an unpaired ventral keel-shaped or digitate process (ledge) arises apically from the window base (in *Rosellea, Phallosphaera*) or a pair of digitate arms arise on both sides of the window (in *Robineauella/ Digitiventra*). In *Seniorwhitea* the posterolateral arms show a paired hairy process on their inside margin. Different forms of the ♂ sternite V are shown in Plates IX, X.

The ♂ abdomen is usually conical or cylindrical (probably a plesiomorphic modality), but in the subtribe Oebaliina of Miltogrammatinae) and in the Neotropical genus *Gerskesia* (Sarcophaginae) the abdomen is shortened and ovate (probably apomorphic). In the females the generalized form is ovate (Hennig 1958), but in *Goniophyto* (Paramacronychiinae) and partly in *Agriella* (Protodexiini) it becomes elongate cone-formed. Kurahashi & Kano (1984) believe that the presence of strong mediomarginal bristles on abdominal tergites is an apomorphy, but in our opinion this view is controversial because in different obviously specialized groups (e.g. *Parasarcophagina*) these bristles are partly reduced or completely absent. This reduction starts consequently with tergites 1+2. The strong bristles on sternites II-IV are substituted by hairs due to a specialization. These hairs become long and dense (in numerous Sarcophaginae). In some genera (*Seniorwhitea, Sarcorohdendofia, Dinemomyia* and in other Sarcophagini) black contrasting haired spots are present on sternite IV (less often or rare in sternites II and III).

The abdominal pattern is rather different (see Plate XI, Figs 1-22). Three approximately triangulate spots on the hind margin of tergites (present in many *Diptera*) seem to represent a plesiomorphy. The central spot is longer than the two lateral ones its tip protruding towards the margin of the next tergite and gradually forming the central stripe. The hind part of tergites is densely bright dusted. The pollinosity of lateral tergal portions and the tergite surface is weaker, so that the tergites appear to be darker laterally. This basic pattern is characteristic of numerous Macronychiinae, Miltogrammatinae and Paramacronychiinae.

The pattern development in Paramacronychiinae shows different trends (Plate XI, Figs 1-6). The presence of bright pollinosity surpresses the dark spots. This process starts on apical tergites and it dilates forwards. At first, the lateral spots disappear, the reduction of the medial spot follows later. As a result the unicolorous bright pollinosity expands all over the abdomen, so that only a narrow medial

dark stripe (e.g. in *Wohlfahrtoides, Blaesoxiphella)* or small spots surrounding the bristle base *(Sarcotachinella)* persist.

The withdrawal of bright pollinosity results in black bands on the hind tergite margins *(Goniophyto, Paramacronychia)* in a particular or entire fusion of spots *(Wohlfahrtia vigil)*, or the abdomen might be completely black *(Nyctia halterata, Wohlfahrtia atra)*. The transformation of the monochromatic bright pollinosity into a chequered pattern is very characteristic. This process in Paramacronychiinae is not caused by the reduction of the black pattern (spots and bands), which contributes more or less to their abdominal chequered ground coloration. The chequered pattern has developed (independently) in different calypterate *Diptera* having an adaptive character. According to some authors (Willmer 1982) this pattern contributes essentially to the thermoregulation.

A similar pattern is developed in the Miltogrammatinae (Plate XI, Figs 11-16). A partial or complete reduction of dark spots is known in some species of *Senotainia, Hilarella* etc. In the species of *Sphenometopa (Xantharaba)* and in the males of some *Pedisiomyia* the lateral spots are absent, but the medial stripe is well developed. Complete tergite hind margin stripes are present in *Phrosinella, Cylindrothecum, Miltogrammatoides, Protomiltogramma* etc. In some groups sexual dimorphism is evident in the abdominal pattern. In males of the majority of species in *Sphenometopa* the abdominal tergites are completely or partly lustrous black, and also in *Mesomelaena mesomelaena* and in *Phylloteles* a similar pattern tends to develop. The females of these taxa show the characteristic (probably plesiomorphic) pattern consisting of three triangulate tergal spots. A chequered abdominal pattern is present in some Miltogrammatini (in the majority of species of *Miltogramma* and *Pterella)*, in Metopiini *(Phrosinella*, subg. *Euhilarella)* etc. (Plate XI, Figs 8, 9, 10, 18, 19-22).

The chequered pattern appears to be probably a plesiomorphic modality in Sarcophaginae (Kurahashi & Kano 1984), but it seems that it might represent an apomorphic status in the other subfamilies. The differentiation of the chequered pattern from separate pattern elements seems to be an independent parallel process in different groups of the sarcophagids. The most common situation is the presence of a central longitudinal stripe and paired lateral spots on each tergite including spots on the fore margin (*Agriella, Blaesoxipha, Helicophagella maculata* etc.). Sometimes the pattern consists of a longitudinal central stripe and of hind marginal blackish bands on each tergite (e.g. *Locustaevora* of Protodexiini, several species of Lepidodexiina in Johnsoniini, in some Sarcophagini/*Boettcherisca timorensis, Sarcorohdendorfia* spp./). The bright unicolorous pollinosity may develop so strongly that the chequered pattern disappears (*Tephromyia, Leucomyia* etc.). In *Notooecus* and in some Sarcophagini (Heteronychiina) the abdomen is entirely lustrous black due to the reduction in pollinosity (Plate XI, Figs 17).

The pollinosity coloration is grey or silvery whitish in generalized groups, which Kurahashi & Kano (1984) believed to be a plesiomorphic modality. The yellowish or golden lustrous pollinosity is, thus, an apomorphy. This kind of pollinosity is usual in Miltogrammatinae, but it is also present in the tropical taxa of paramacronychiine and sarcophagine flesh-flies.

## ♂ terminalia

(Plates III-VIII)

The structure and form of the ♂ terminalia is important both taxonomically (identification of taxa) and for phylogenetical considerations. The postabdomen of the calypterate Diptera consists of protandrium (including segments VI, VII and VIII fusing in the syntergosternites VI+VIII in sarcophagids) and hypandrium (epandrium, hypopygium and their appendages – see McAlpine 1981, Tschorsnig 1985).

**Segment VI** tends towards reduction. Tergite VI is well sclerotized and provided with marginal setae in Macronychiinae and in some Miltogrammatinae (e.g. *Senotainia*). In the majority of miltogrammatines tergite VI is bare and poorly sclerotized (probably an apomorphic status). In the majority of Paramacronychiinae this tergite is almost entirely absent, its membranous indication existing only in the tribe Helicoboscini (Rognes 1986). In the Sarcophaginae the reduced traces of tergite VI are limited to little plates surrounding the spiracles on the fused syntergosternite. Sternite VI is usually bare, symmetrical and connecting sternite V with the anteroventral angles (corners) of the fused syntergosternite (Plate VIII). In the paramacronychiine genus *Chrysogramma* and in all Sarcophaginae this sternite is asymmetrical (probably an apomorphic situation) with the left part preserved as a result of the genitalia rotation during evolution. The syntergosternite (fused segments VII+VIII) forms an

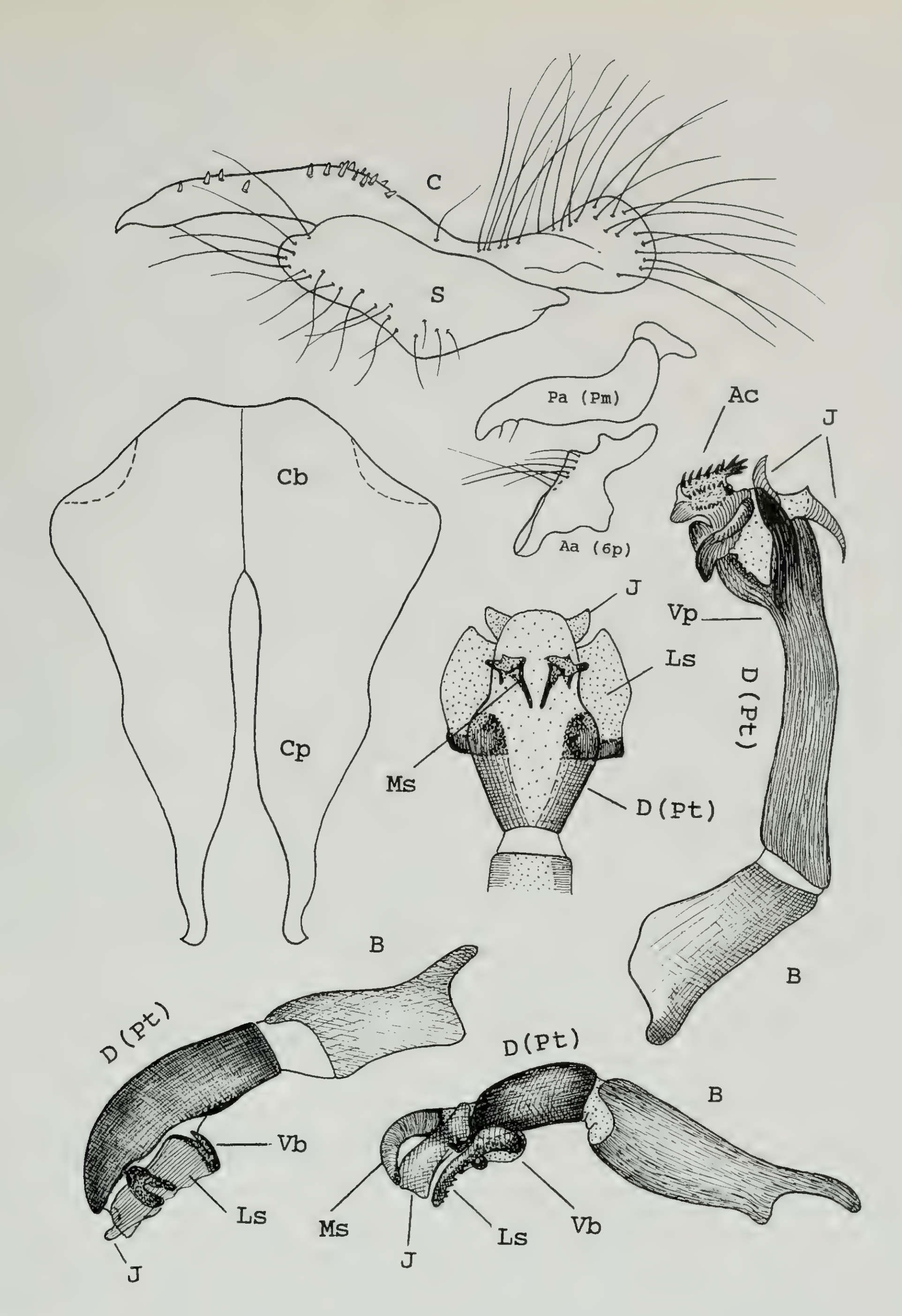



**Plate III**

Details of male genitalia in protodexiine (*Blaesoxipha* s. lat.) Sarcophaginae. **Aa (Gp)**, anterior apophyse (Gp, gonopod); **Ac**, acrophallichorn; **B**, basiphallus; **C**, cercus; **Cb**, cercus base; **Cp**, cercal tip (prong); **D (Pt)**, distiphallus (phallis tube); **J**, Juxta; **Ls**, lateral stylus; **Ms**, medial stylus; **Pa (Pm)**, posterior apophyse (Pm, paramere); **Vb**, ventromedial bridge; **Vp**, ventromedial plate. Redrawn and adapted from Pape (1994).

arched, more or less elongate cylinder, with a row of setae along the fusion of the two segments and with or without the marginal setae, their absence being probably secondary. Some authors call it "genital tergite" or "7+8 tergite" (Patton & Ho 1938), "7th tergite" (Roback 1954), "7th segment" or "first genital segment" (Lopes 1956) (Plate VIII).

**The epandrium ("hypandrium")** is usually the same length as the syntergosternite, but it is distinctly shorter in some Sarcophaginae (probable apomorphy). Posterior to the epandrium are the paired cerci and surstyli. Some authors mark them as "tergite 9" (Senior-White 1924), "segment 9" (Lopes 1956), "periandrium" (Griffith 1972) (Plate VIII).

The **cerci** are symmetrical, elongate, with basal part complete, tips are more or less divergent. Their plesiomorphic modality seems to be their spiny form and non-specialized setose surface. Their form can differ or be specialized in different taxa. They are completely fused in *Sarcotachina*. In *Protomiltogramma* (Miltogrammatinae) their apical part is narrow and straight, similarly as in numerous Paramacronychiinae and Sarcophaginae. The apical part is sometimes sharply curved dorsally [in Protodexiini and Impariini (Sarcophaginae) or in *Agria monachae* (Paramacronychiinae)]. In different groups of Sarcophaginae they can develop a preapical protuberance (hunch) dorsally (e.g. in several taxa of *Heteronychia*). In some *Miltogramma* species (Miltogrammatinae) they are differentiated into the dorsal and the ventral arms. In several species of Sarcophagini longitudinal lateral (e.g. in *Bercaea, Liopygia*), or alate plates *(Stackelbergeola)* are present. Such and similar modifications are obviously of adaptive character. Usually the cerci are covered with long bristles, hairs or setae basally, becoming shorter apically. Sometimes they are completely covered with short erect setae *(Eremasiomyia)*, or short spines are present apically *(Kramerea, Blaesoxipha)*. Sometimes specialized groups of dorsal setae (bunches) are present basally *(Boettcheria, Protodexia)* or apically *(Seniorwhitea, Leucomyia)*. Some authors mark them as "superior claspers" (Senior-White 1924), "anal cerci" (Patton, Ho 1938), "forcipes superiores" or "external forcipes" (Lopes 1956) (Plates III, IV).

The **surstyli** show different forms. They are elongate in Macronychiinae and in some generalized taxa or other subfamilies, which might represent a plesiomorphic modality. They are shorter in most Sarcophaginae and in *Blaesoxiphella* of Paramacronychiinae which might be a specialized (apomorphic) modality. They may develop secondary appendages *(Protomiltogramma)* or show apical dilatation (*Sarcophila, Agria* etc.). Some authors call them "coxites" (Rohdendorf 1937), "paralobi" (Zumpt & Heinz 1950), anal plates (Roback 1954), "telomeri" (Griffith 1972) (Plates III, IV).

The so-called **"bacilliform sclerites"** are paired elongate structures connecting the lateral parts of hypandrium with the base of surstyli and situated at ventral hypandrium membrane. They were studied by Richter (1980) in different sarcophagine groups. They are more or less distinct and elongate in Macronychiinae, Miltogrammatinae and in some Paramacronychiinae, which might represent a less specialized status. In some species they are wider with an internal hook-shaped appendix (in *Senotainia conica*). In the majority of Sarcophaginae they are partly reduced, or absent. Hennig (1973) named them "processus longi", Richter (1980) "bare-shaped sclerites".

The **hypandrium** is a symmetrical trough-shaped structure. Its anterior part is rather elongate in a part of Sarcophaginae, and it seems that the elongation (probably a specialized situation) helps balance the heavily sclerotized aedeagus. Senior-White (1924) used the term "paraphallus" for this structure.

The **pregonites** consist of a basal (gonocoxite) and apical sclerite (gonostylus); only the form of gonostylus is applied in sarcophagid taxonomy and it is generally named pregonite or gonopod. They are either connected with or separated from the hind part of the hypandrium (the hook-shaped profile seems to be their generalized form). Some sensorial setae may be present on their dorsal edge. In numerous Sarcophaginae (e.g. in species of *Parasarcophaga* s.str.) and in some Wohlfahrtiina their shape is elongate and narrow apically (Figs 155, 156) and in *Helicophagella noverca* they are short and obviously reduced (Fig. 168). Rohdendorf (1937), Patton & Ho (1938), Zumpt & Heinz (1950) call them "fore parameres"; Roback (1954) "anterior claspers"; Lopes (1956) "palpi genitales"; McAlpine (1981) "gonopods" (Plates III, V).

The **postgonites** following the pregonites are situated laterally on both sides of the aedeagus. Their generalized form is elongate, curved ventrally with hooklet-shaped tip, and with one ventral bristle. In several sarcophagine taxa this bristle is substituted by several weaker setae. But considerable variation may occur in this respect. Their straight rod-shaped form is characteristic of some miltogrammatines (*Metopodia, Eremasiomyia* etc.). They are very wide with an apical hook in Oebaliina. Numerous

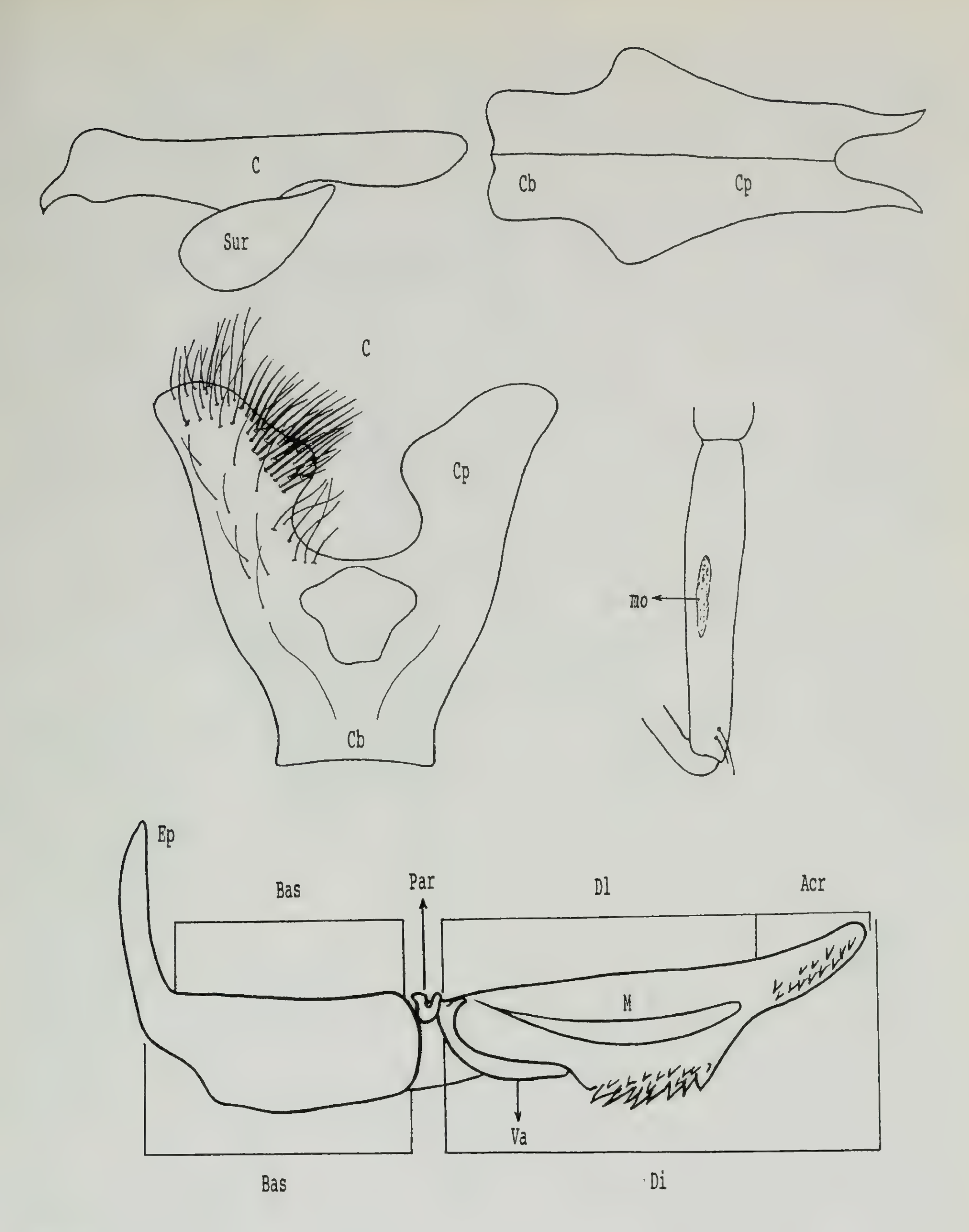



**Plate IV**

Structural details of Sarcophaginae. Above: Cercus laterally (left) and dorsally (right) of malegenitalia: **C**, cercus; **Cb**, cercus base; **Cp**, cercus prong(tip); **Sur**, surstylus; Middle left: Vth abdominal sternite ofmale (Cb, sternal base; Cp, sternal arms); Middle right: Female mid tibia with mid-femoral organ (mo); Bottom: Miltogrammatine aedeagus: **Acr**, acrophallus; **Bas**, basiphallus; **Di**, distiphallus; **Dl**, dorsolateral process of-distiphallus; **Ep**, epiphallus; **M**, medial appendix of paraphallus; **Par**, paraphallus; **Va**, ventral appendix of paraphallus. (Adapted from Rohdendorf 1937 and Pape 1987b).

modifications of their form exist in different subfamilies. Senior-White (1924) and Roback (1954) call them "posterior claspers"; Patton & Ho (1938), Rohdendorf (1937, 1967) "hind parameres"; Lopes (1956) "forcipes interiores" or "internal forcipes"; McAlpine (1981) "parameres" (Plates III, V).

The **aedeagus apodeme** is a sclerite actively connected with the aedeagus basally by muscles responsible for the aedeagus movement. It is usually rod-shaped, showing considerable shape adaptation of little taxonomic importance. Rohdendorf (1937) calls it "apodemus of phallosoma", Hennig (1958) "Phallapodeme".

The **ejaculatory apodeme** (Ejaculatorapodeme of Hennig 1958) is a sclerite connected with the base of the aedeagus and showing usually a spatulate form. Its paired musculature is responsible for the ejaculatory contractions of the spermaducts (or ampula). Rohdendorf (1937) calls it "diaphragme of ampula"; Zumpt & Heinz (1950) "sperm pump sclerite".

The **aedeagus** or **phallosome** (Patton 1932, Rohdendorf 1937) is the central structure arising behind sternite IX of hypandrium. Its shape is of primary importance in the taxonomy of the Sarcophagidae. It consists of two parts – the basiphallus and the distiphallus. In the majority of sarcophagine subfamilies these two parts form a rigid complex, and only in some sarcophagine and paramacronychiine genera *(Eumacronychia, Nyctia, Eurychaeta)* are the connections mobile. Different terms are applied to them: The basiphallus is called the "first joint of penis" (Johnston & Hardy 1923), "hypophallus" (Senior-White 1924), "phallotheca" or "theca" (Patton 1932, Rohdendorf, 1937, Zumpt & Heinz 1950), "phallophore" (Roback 1954). The distiphallus is named "second joint of penis" (Johnston & Hardy 1923), "aedeagus" (Patton & Ho 1938), "phallus" (Roback 1954, Lopes 1956), "penis" (Senior-White 1924, Rohdendorf 1937) (Plates III, IV, V).

The **basiphallus** shows a strong lateral sclerotization in sarcophagids. It has a hook-shaped postdorsal appendix, the epiphallus, or "spinus titillatorius" (Patton 1932, Rohdendorf 1937) in generalized groups. The muscles arising from it move the aedeagus. In some Sarcophagini (*Paramacrophagina, Boettcheriscina* etc.) the basiphallus is secondarily shortened and widened (probably apomorphic modality).

The **distiphallus** generalized structure is elongate, membranous with a paired narrow dorsolateral sclerotization (so-called primitive paraphallus) as is seen in Macronychiinae. The so-called paraphallus starts with the above sclerotization of distiphallus representing the gradual specialization of distiphallus. It is called "sheath" (Johnson & Hardy 1924), "juxta" (Senior-White 1924), "Harpebasis" (Zumpt & Heinz 1950), "corpus" (Roback 1954), "dorsal plate + dorsolalateral process" (McAlpine 1981). (Plates III, IV, V).

The probable plesiomorphic modality of paraphallus (in *Macronychia*) shows a dorsal plate connected with the basiphallus and a paired dorsolateral process connected with the dorsal plate apically.

The **membranous ventral part** of paraphallus forms a spinose ventral process at lower surface of distiphallus, the acrophallus is a structure situated apically at distiphallus. It is membranous, with numerous spines. The openings of the spermaducts are situated at tip of distiphallus. The majority of miltogrammatines show an additional enforcement in the form of a paired appendix extending from the dorsal plate to the ventral process (ventral plate). Sometimes an additional structural element, the medial process, extends from the ventral plate and the proximity of the spermaducts to the acrophallus (*Senotainia puncticornis, Oebalia* spp. etc.). In species of *Ammobia* the medial process is strongly developed, reinforcing the distiphallus, the other paraphallus structures being reduced. In *Chrysogramma* the reinforcing structure is generally the dilated ventral process, but the dorsolateral process is not reduced. In the species of *Protomiltogramma* the medial processes and the dorsal plate are fused forming a strong sclerite near the base of the acrophallus.

The form of the acrophallus is various. It can be short (e.g. in *Amobia, Senotainia, Macronychia/Moschusa*) or rather elongate (*Protomiltogramma, Opsidia*). In *Oebalia* the acrophallus is usually narrow and curved ventrally, or the dorsolateral process of paraphallus is partly prolonged to acrophallus (Plate IV).

The ventral process is sometimes widened (e.g. in *Amobia, Taxigramma, Oebalia, Ptychoneura*).

It seems generally that the structure of the aedeagus in Macronychiinae, Miltogrammatinae and in some Paramacronychiinae is less specialized regardless of specialized elements. Among Paramacronychiinae the generalized aedeagus exists in the Chrysogrammatini and is not differentiated from the aedeagus of Miltogrammatinae. The spermducts in Goniophytoini are situated distally on the elongate

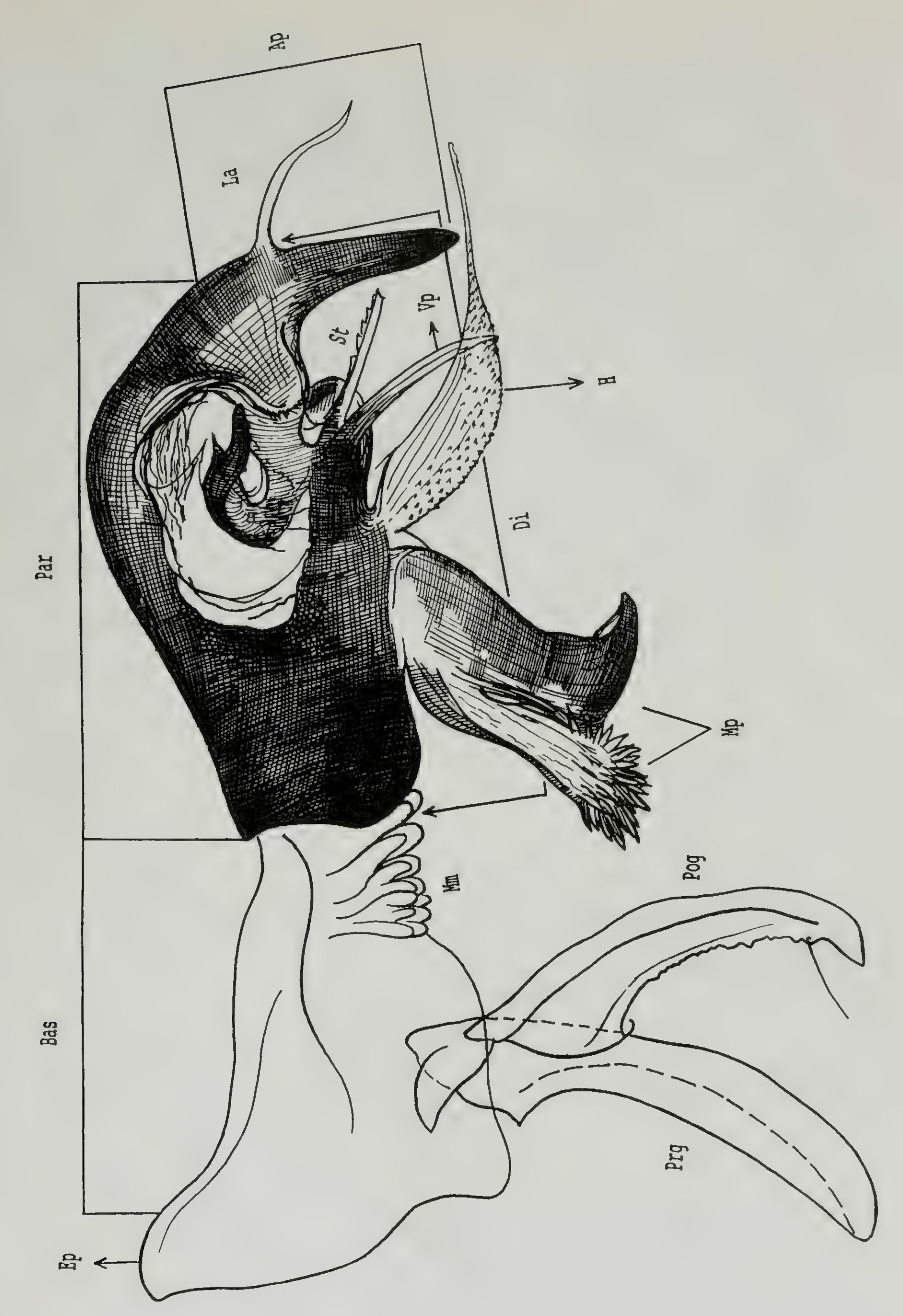



**Plate V**

Aedeagus (phallus) of sarcophagiine Sarcophaginae. **Ap**, apical plate of distiphallus; **Bas**, basiphallus; **Di**, distiphallus; **Ep**, epiphallus; **H**, harpe; **La**, lateral arm (process) of apical plate; **Mm**, membrane; **Mp**, membranalprocess; **Par**, paraphallus; **Pog**, postgonite (posteriorapophyse – paramere); **Prg**, pregonite (anterior apophyse – gonopod); **St**, stylus; **Vp**, ventral process of distiphallus. Original drawing.

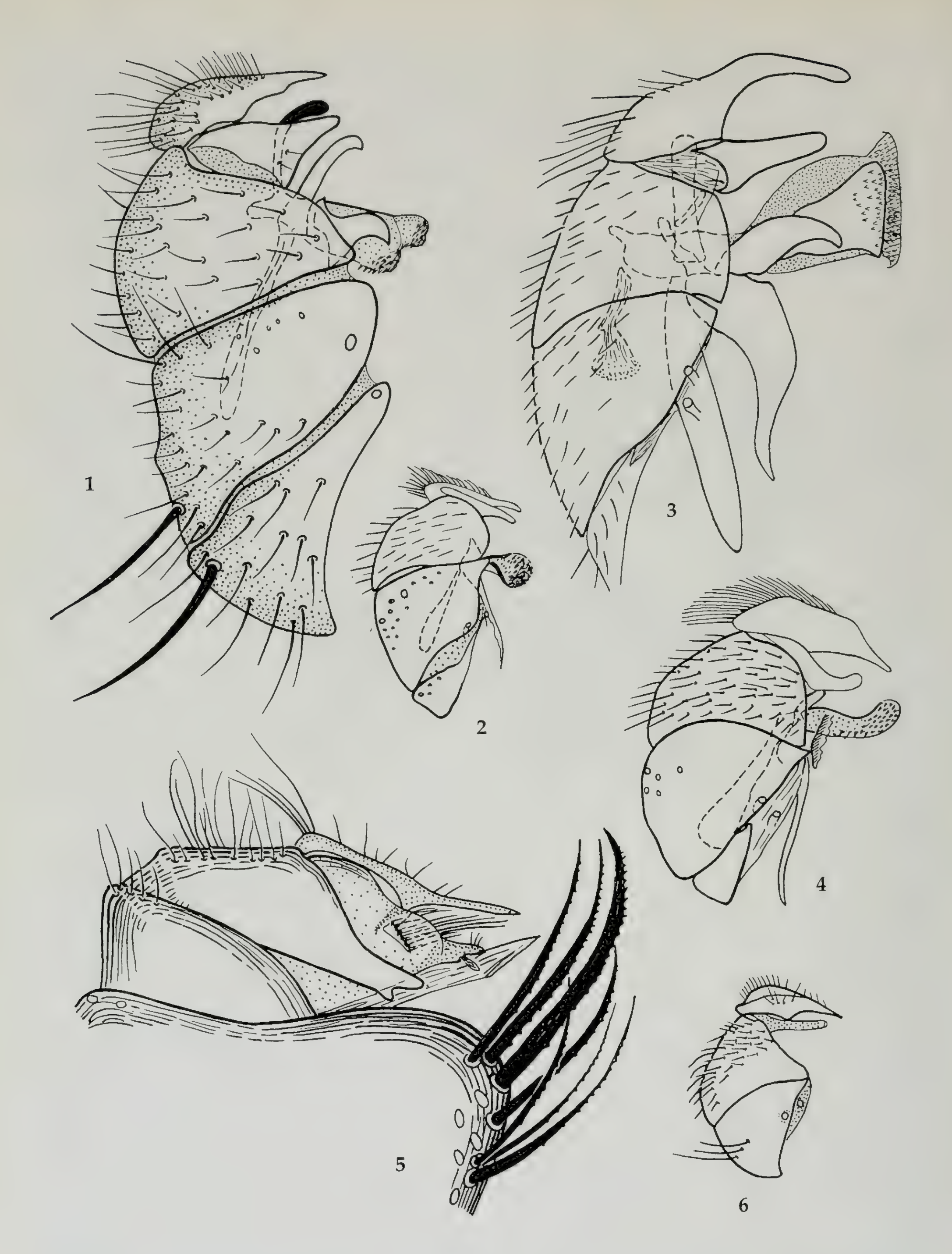



**Plate VI**

**Figs 1-6.** Male terminalia of different sarcophagid groups (subfamilies, tribes and genera). **1.** *Macronychia polyodon* (Meig.) (Macronychiinae). **2.** *Senotainia deserta* Rohd. (Miltogrammatinae). **3.** *Amobia signata* (Meig.) (Amobiini). **4.** *Chorezmomyia geophila* Rohd. (Miltogrammatini). **5.** *Protomiltogramma seniorwhitei* (Verv.) (Miltogrammatini). **6.** *Chrysomyia parva* Rohd. (Chrysomyinae). (Original drawing).

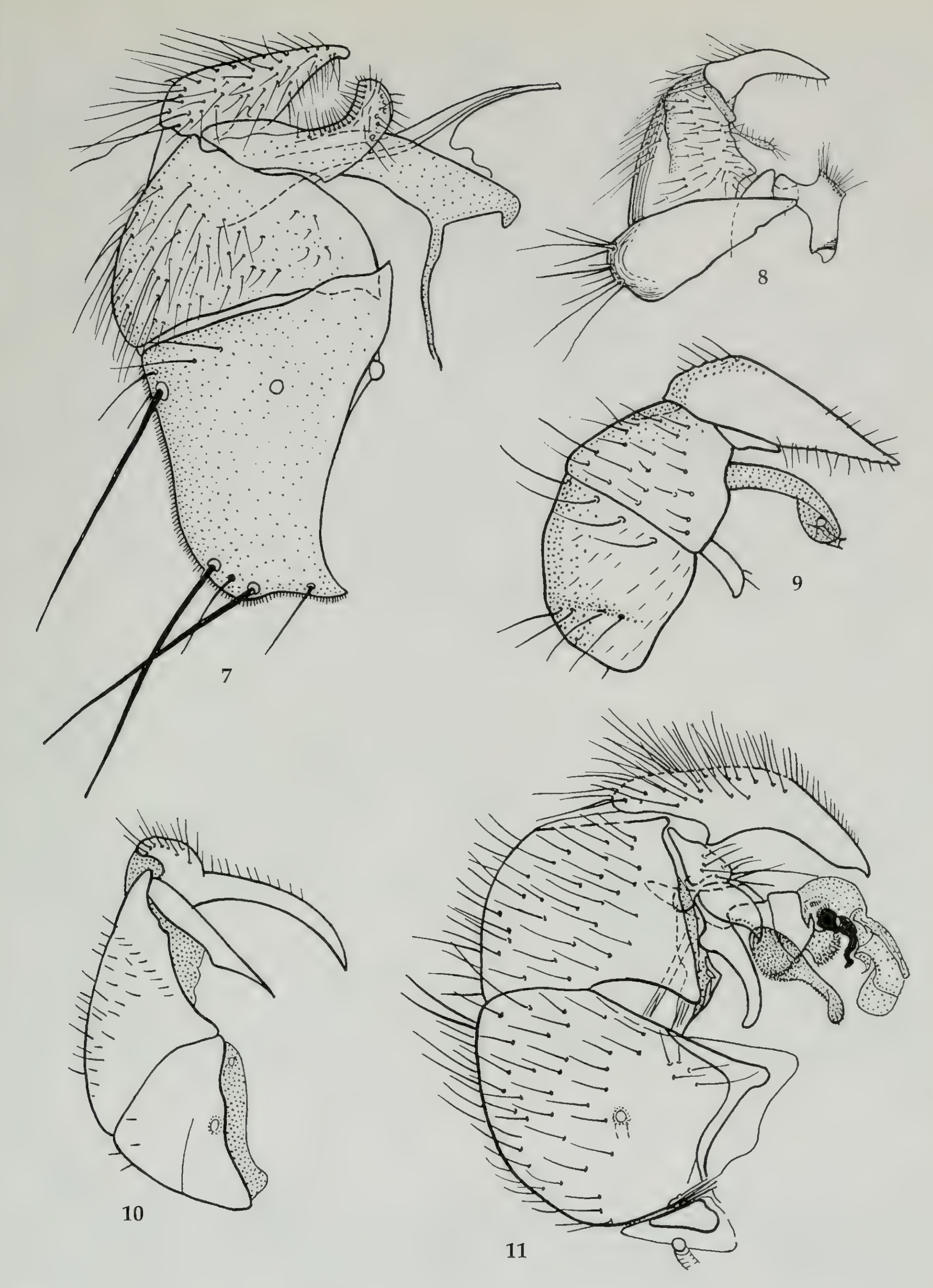



**Plate VII**

**Figs 7-11.** Male terminalia of different sarcophagid groups (subfamilies, tribes and genera). 7. *Geniophyto hunshuensis* Rohd. (Paramacronychiinae). **8.** *Sarcotachina subcylindrica* Port. (Paramacronychiinae). **9.** *Blaesoxiphella brevicornis* Villn. (Protodexiini). **10.** *Xiphidiella anorubra* (Villn.) (Paramacronychiinae, Eumacronychiini). 11. *Athyrsomima stackelbergi* Rohd. (Sarcophagini). (Original drawing).

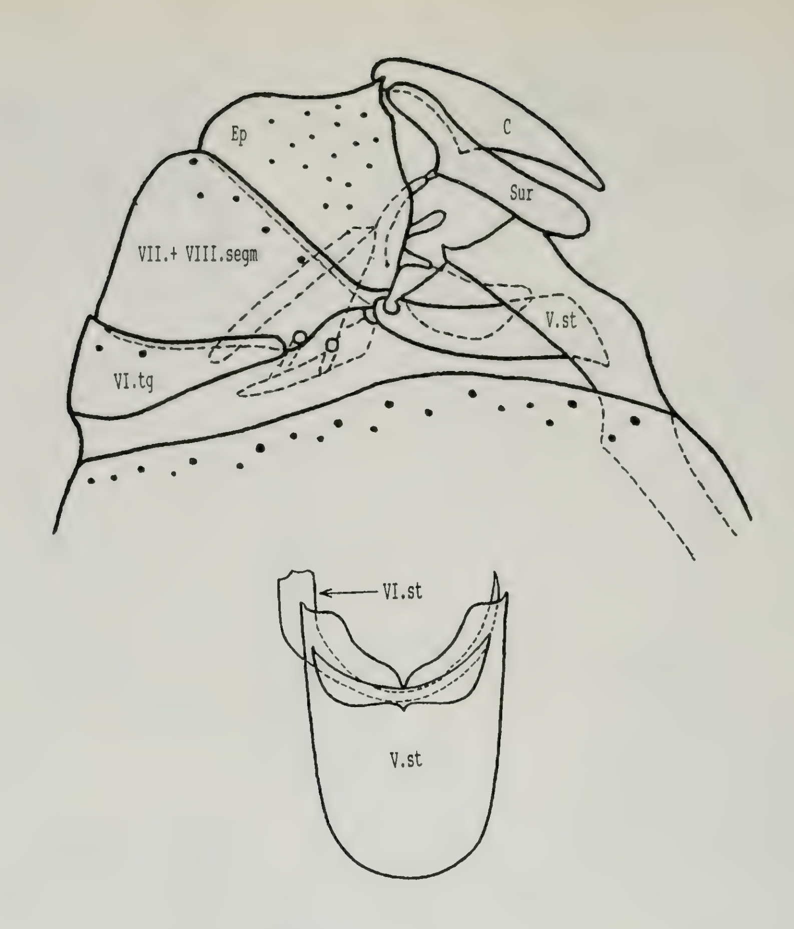


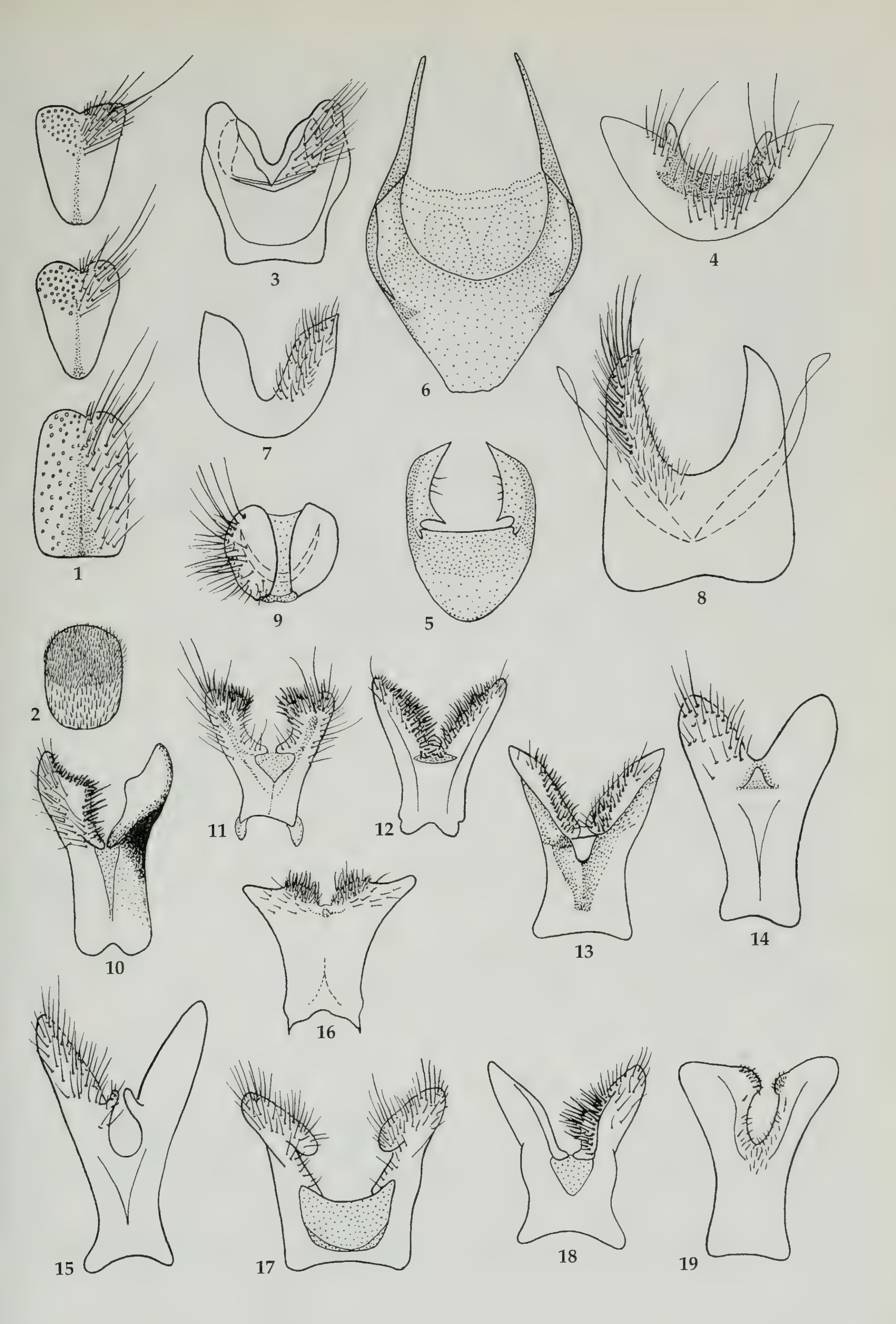

**Plate VIII**

Details of miltogrammatine terminalia (postabdomen) (above) and sternite V and VI (bottom) in *Sphecapatodes ornatus* (Villn.). **C**, cercus; **Ep**, epandrium; **Sur**, surstylus, and the corresponding tergite, syntergite and sternites. (Adapted from Rohdendorf 1937).

acrophallus. Their specialized (possibly apomorphic) modalities reflect in the desclerotization of the paraphallus and in their replacement on the ventral process of the paired elongate spineless arms. The apical situation of the spermaducts is characteristic of Sarcotachinini and the specialized status reflects in the distinct separation of basiphallus and distiphallus, in the reduction of the epiphallus and in the

**Plate IX**

Male sternites of: **1.** *Senotainia conica* (Fall.) (Miltogrammatini) (2nd-4th). **2.** *Seniorwhitea reciproca* (Wlk.) (Sarcophagini) (4th); 5th male sternites of: **3.** *Senotainia conica* (Fáll.) (Miltogrammatini). **4.** *Chorezmomyia geophila* Rohd. (Miltogrammatinae). **5.** *Protomiltogramma nandii* (Verv.) (Miltogrammatini). **6.** *Protomiltogramma seniorwhitei* (Verves) (Miltogrammatini). **7.** *Chrysogramma parva* Rohd. (Chrysogrammatinae). **8.** *Xiphidiella anorubra* (Villn.) (Xiphidiellina). **9.** *Eumacronychia persolla* Reinh. (Macronychiinae). **10.** *Liosarcophaga djakonowi* (Rohd.) (Sarcophagini). **11.** *Thyrsocnema* s. str. (Sarcophagini). **12.** *Parasarcophaga musashinensis* (Kano & Okazaki) (Sarcophagini). **13.** *Boettcherisca peregrina* (R.-D.) (Sarcophagini). **14.** *Phallosphaera gravelyi* (S.-W.) (Sarcophagini). **15.** *Robineauella pseudoscoparia* (Kr.) (Sarcophagini). **16.** *Athyrsomima stackelbergi* Rohd. (Sarcophagini). **17.** *Kanoa okazakii* (Kano) (Sarcophagini). **18.** *Takanoa rugosa* Rohd. (Sarcophagini). **19.** *Seniorwhitea reciproca* (Wlk.) (Sarcophagini). (Original drawing). ▷


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elongation of the distiphallus. The ventral process is absent. In Eumacronychiini a strong hook-shaped plate is situated at the base of the dorsolateral processes of the paraphallus. In the genus *Xiphidiella* (Paramacronychiinae) the basiphallus and the distiphallus are complete (a generalized situation), but the ventral process is separated into the paired awl-shaped distal arms and the spinose central part. The acrophallus is apically broader. In *Eumacronychia* the structure of the acrophallus is complex: In *E. personella* it is prolonged and covered by a membranous setose "envelope", the spermaducts are well sclerotized (see Verves 1990b). In *E. sternalis* the acrophallus is situated ventrally showing a strong apical sclerotization (Lopes 1982b). Such ventral displacement of acrophallus is named "hypophallus" (Rohdendorf 1937). A membranous process (distad of paraphallus) replaces the acrophallus (Plates III, IV, VI, VII).

A progressive sclerotization of the paraphallus, the development of a complete hypophallus and the presence of the apical plate of the distiphallus is characteristic of the tribe Paramacronychiini. In the nominate subtribe Paramacronychiina the aedeagus shows a generalized situation: The epiphallus is long, the dorsolateral processes of the paraphallus are narrow, the apical plate is widely membranous. The ventral process becomes paired, and is well sclerotized. In *Brachicoma, Wohlfahrtia* and in some other taxa the structures situated ventrally and apically from the paraphallus are well sclerotized resulting in a completely sclerotized distiphallus. The hypophallus shows different modifications, it becomes reduced or desclerotized, and the epiphallus becomes shorter (Plates VI, VII).

The genus *Eurychaeta* (Helicoboscini) shows a peculiar situation, its basiphallus and distiphallus being fused and mobile. The distiphallus consists of a basal and an apical part. The basal part is a heavily sclerotized plate resulting from the fusion of the ventral paraphallus processes and the ventral protuberance. The apical part is dorsally formed by the dorsolateral processes of the paraphallus and by the short and wide paraphallus ventrally. The opinion of Rognes (1986) that the hypophallus was probably concerned is possibly incorrect, because the spermaduct opening is situated apically and because the spines on its surface are charactristic of the acrophallus.

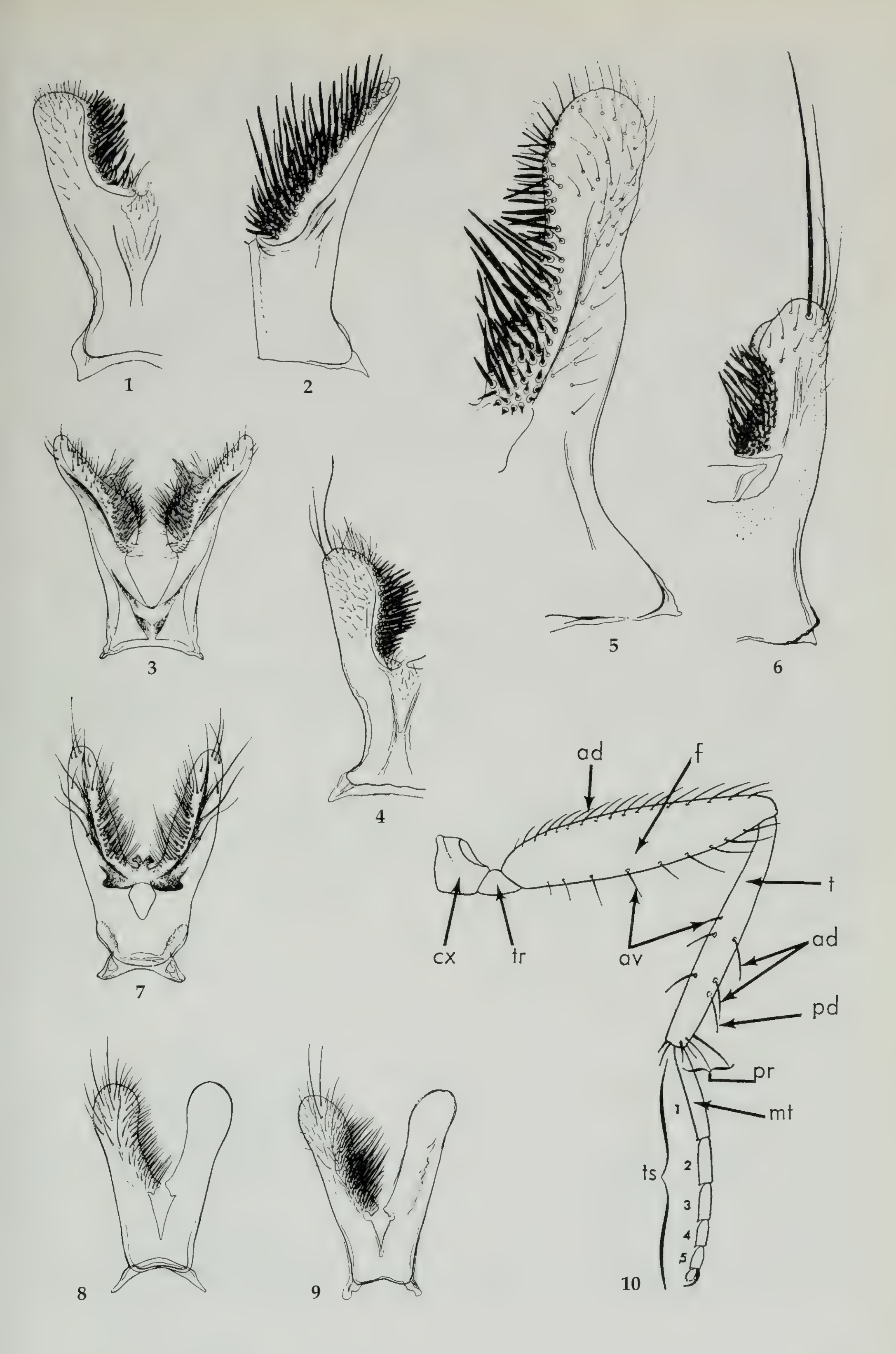
In *Helicophagoides pagensis* (Sarcophagini), the entire distiphallus shows a complex specialization which makes its individual structures difficult to homologize. Its probably missing musculature but obvious "stiffness" indicates that its movement is brought about through the varying pressure of haemolymph (Povolný 1994).

Two specializations of the aedeagus exist among the tribes of Sarcophaginae. The aedeagus in Sarothromyiini and in Raviniini is complete and sclerotized. The epiphallus is usually well developed in Sarothromyiini, but is more or less reduced in Raviniini. These two tribes have paired ventral processes, which are derivatives of the ventral process (protuberance). Their hypophallus is differentiated into the so-called "internal parts of distiphallus". The other specialization trend shows a mobile fusion of the basiphallus and the distiphallus (in all other tribes). This fusion follows longitudinally along the aedeagus axis (Verbeke 1963). At the place of the mobile fusion the membranal connections may be present (see membranal lobes etc.). They can be situated ventrad of the distiphallus, showing sometimes a distal continuation. Some authors (Roback 1954, Tschorsnig 1985) confused them with the ventral processes of the distiphallus, although the membranal lobes are situated between the basiphallus and distiphalus.

The **membrane** and its derivatives. The generalized form of this structure is its situation between the basiphallus and the distiphallus (e.g. in Protodexiini and in Helicobiina). In Helicophagellina this membrane shows a sclerotized, unpaired distal spine or at least a sclerotized process. In Phytosarcophagina and in Heteronychiina the distal part of the membrane protrudes to form an unpaired awl-

**Plate X**

**Figs 1-9.** Male sternite V of: **1.** *Liosarcophaga portshinskyi* Rohd. (Sarcophagini). **2.** *Heteronychia hirticrus* (Pand.) (Sarcophagini). **3.** *Helicophagella noverca* (Rond.) (Sarcophagini). **4.** *Liosarcophaga jacobsoni* Rohd. (Sarcophagini). **5.** *Pandelleisca similis* (Meade) (Sarcophagini). **6.** *Pseudothyrsocnema spinosa* Villn.) (Sarcophagini). **7.** *Pierretia soror* (Rond.) (Sarcophagini). **8.** *Pierretia lunigera* (Böttch.) (Sarcophagini). **9.** *Pierretia discifera* (Pand.) (Sarcophagini).
**Fig. 10.** Chaetotaxy of third leg, frontal view: **ad** - anterodorsals; **av**, anteroventrals; **cx**, coxa; **f**, femur; **mt**, metatarsus; **pd**, posterodorsals; **pr**, praeapicals; **t**, tibia; **tr**, trochanter; **ts**, tarsomeres (Original drawing).


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shaped or digitate appendix. The majority of Sarcophaginae show more or less sclerotized, elongate membranal processes or arms. Some authors have used the terms "vesica" (Senior-White 1924, Roback 1954, Pape 1987) and "ventralia" (Lopes 1956). The membranal process(es) are either unpaired or paired, sometimes petiolate (in *Parasarcophaga* s.str., etc.), or two paired membranal processes are present (in *Liosarcophaga/Pandelleisca*). In numerous groups (Johnsoniini, some Phallanthiina, Boettcheriscina etc.) these processes are spinose.

The **harpes** are paired curved processes between the membrane and the distiphallus. They arise from the interior wall of the membrane. Some previous authors (Rohdendorf 1937, Roback 1954) confused them with the membranal processes. These structures are especially distinct in *Thyrsocnema* (Sarcophagini).

The origin of the basal and the apical part of the distiphallus and their appendages were studied in groups having poorly sclerotized distiphallus: The paraphallus of *Hypopelta scrofa* (Microcerellini) consists of well visible dorsolateral and ventral processes. The other parts of distiphallus are membranous, but the ventral process (protuberance) is well differentiated. In Johnsoniini, Emblemasomatini and Sarcodexiini all paraphallus processes are widened forming lateral sclerotized plates, which can be more or less distinct also in some other tribes. These plates are called the paraphallus (Lopes 1956), a term often comprising all other distiphallus structures. The next names used are "prepucium" (Senior-White, 1924), basal part of paraphallus (Rohdendorf 1937), "lobi laterales" (Patton & Ho 1938), "corpus" (Roback 1954).

The **ventral processes** or arms of distiphallus are the derivatives of the ventral process (protuberance) and they fuse sometimes secondarily with the paraphallus. In some instances (e.g. in Helicobiina) they are flat and situated ventrolaterad of the paraphallus. They may be also elongate and specialized into complex structures. Identical terms used are "appendage of juxta" (Senior-White 1924), "ventral lobi" (Patton & Ho 1938), "ventral processes of basal part of paraphallus" (Rohdendorf 1937), "vesica" (Zumpt & Heinz 1950), "lateral plates" (Lopes 1956), "ventral plates" (Pape 1987).

The correct name for the paraphallus appendix (short, pointed processes on the dorsal surface of the paraphallus) characteristic of *Helicophagella* is "auricula".

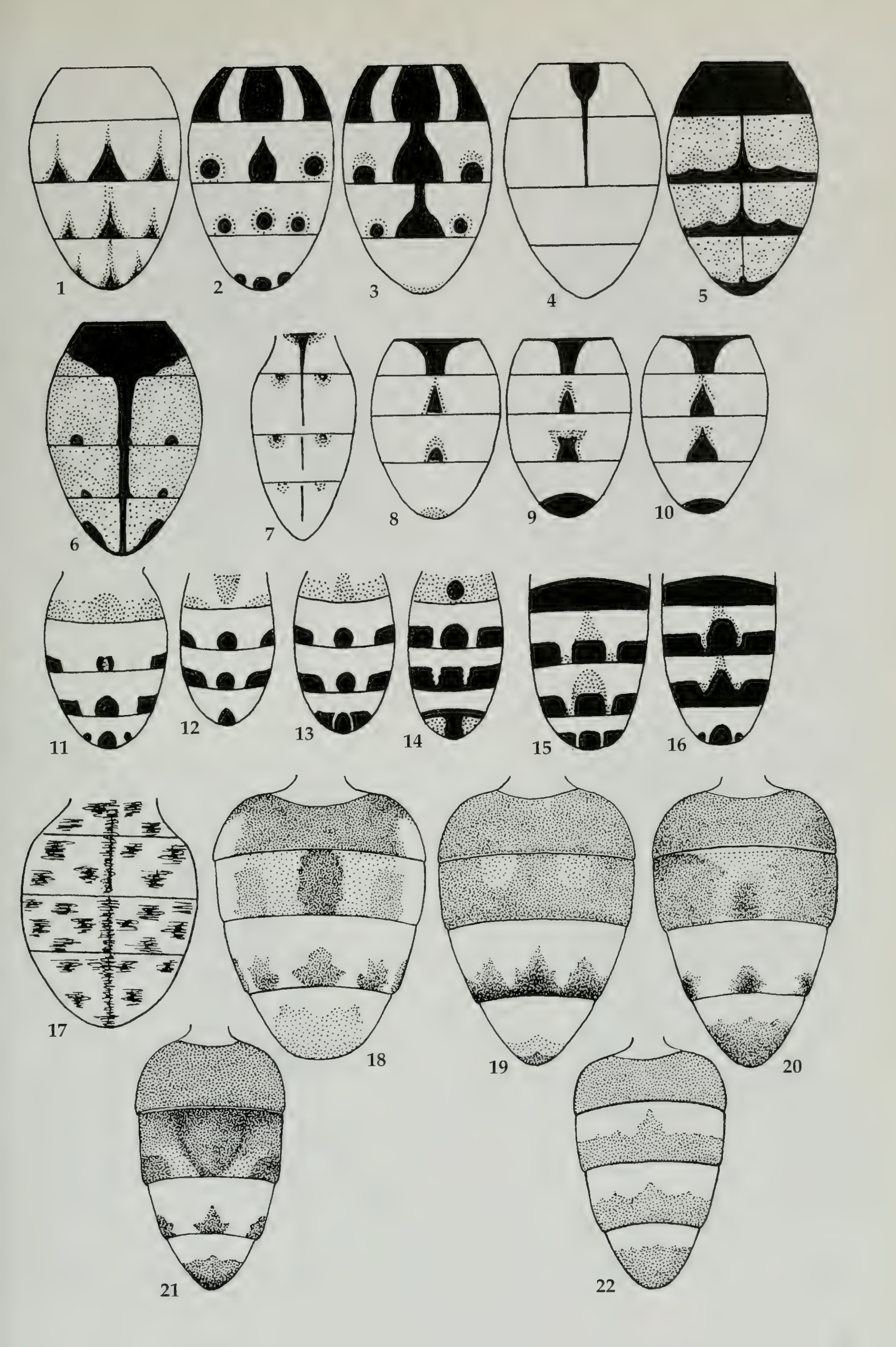
The **apical plate** (Lopes 1956) results from the sclerotization of the membranous parts forming the tip of the paraphallus. The additonal structures of the apical plate are the following: its paired lateral arms of various length and form, the extension of the apical plate, spinose surface of this plate and of its arms. The lateral plate was usually called "harpes" (Senior-White 1924), "apical process" (Johnston & Hardy 1923), "apical lobi" (Patton & Ho 1938), "apical part of paraphallus" (Rohdendorf 1937), "juxta" (Zumpt & Heinz 1950, Roback 1954).

The interior parts of the distiphallus are the derivatives of the hypophallus. The complete hypophallus of Sarcophaginae is present only in *Imparia impar* (Impariini) and it is thoroughly asymmetrical. In the other species of Impariini the hypophallus is divided into the individual sclerites. The development of these interior structures of distiphallus shows different trends in different groups of Sarcophagidae analyzed by Roback (1954).

The central part of the hypophallus may change to form the paired and comparatively short **medial process** (in Raviniini and Sarcophagini) which is usually invisible from the outside. It can be seen only

**Plate XI**

**Figs 1-22.** Abdominal pattern (dorsal view) in sarcophagid males of: **1.** *Sarcophila latifrons* (Fll.) (Paramacronychiini). **2.** *Wohlfahrtia (indigena)* (Vill.) (Paramacronychiini). **3.** *Wohlfahrtia pavlovskyi* Rohd. (Paramacronychiini). **4.** *Wohlfahrtoides marzinovskyi* Rohd. (Paramacronychiini). **5.** *Paramacronychia flavipalpis* (Girschn.) (Paramacronychiini). **6.** *Agria punctata* R.-D. (Paramacronychiini). **7.** *Agriella* sp. (Protodexiini). **8.** *Sphenometopa steini* (Schin.) (Oebaliini – Sphenometopiina). **9.** *Sphenometopa satunini* Rohd. (Sphenometopiina). **10.** *Sphenometopa lindneri* Verv. (Sphenometopiina). **11.** *Pediasiomyia przhevalskiji* Rohd.(Miltogrammatini). **12.** *Miltogrammatoides maximum* Rohd.) (Miltogrammatini). **13.** *Miltogrammatoides alashanicus* Rohd. (Miltogrammatini). **14.** *Miltogrammatoides affinis* Verv. (Miltogrammatini). **15.** *Miltogrammatoides dissidens* Verv. (Miltogrammatini). **16.** *Miltogrammatoides zaitzevi* Verv. (Miltogrammatini). **17.** *Liosarcophaga* sp. (Sarcophagini). **18.** *Sphenometopa stackelbergi* Rohd. (Sphenometopiina). **19.** *Sphenometopa kozlovi* Rohd. (Sphenometopiina). **20.** *Sphenometopa fastuosa* (Meig.) (Sphenometopiina). **21.** *Sphenometopa suskini* Rohd. (Sphenometopiina). **22.** *Sphenometopa przewalskii* Rohd. (Sphenometopiina). (Original drawings, Figs 18-22 adapted from Rohdendorf 1971b, 1975). ▷


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Plate XII

Habitus of important representatives of sarcophagine genera. **1.** *Servaisia erythrura* (Meig.); **2.** *Pandelleana protuberans* (Pand.); **3.** *Liopygia crassipalpis* (Macq.); **4.** *Bercaea cruentata* (Meig.); **5.** *Heteronychia depressifrons* (Zett.); **6.** *Sarcotachinella sinuata* (Meig.). (After Rohdendorf 1937).

in some groups (in the lateral view) having the form of a short, wide sclerite situated between the styli, and reinforcing the apical plate ventrally (in *Pierretis* s.str., *Pandelleana*, *Bellieriomima* etc.). In some Protodexiini *(Agriella, Blaesoxipha)* an elongate bristle-shaped medial process is situated dorsoapically from the limen (Verves 1985). In Parasarcophagina, Bottcheriina, Heteronychiina and Helicobiina the medial processes are reduced in form of short sclerites situated at the base of two elongate paired sclerites, the so-called "capitis" (Roback 1954), and in Helicophagellina the shortened "capitis" are situated on the tip of the elongate medial process (Plate V).

The **styli** are the elongate, shorter or longer paired sclerites situated on the outside of the medial processes or "capitis" representing sclerotized ledges of the spermaducts. They are short and directed ventrally in Helicophagellina. In the majority of Sarcophaginae they are slender prolonged, more or less straight or only moderately curved, spinose or serrate, only rarely widened and complex (e.g. in Boettcheriscina). Roback (1954) names them "lateral arms", or "lateral filaments".

The **"hillae"** (Roback 1954) are well sclerotized, wide and often petiolate processes arising from the base of styli (and characteristic only of Raviniini).

The **"limen"** (Roback 1954) is an elongate, wide, paired sclerite situated on the outside of the medial processes and protruding ventrally (in Protodexiini). In *Servaisia* (Acridiophaga) the limen protrudes apically and a special membrane ("apical plate") surrounds its base.

The **"parastyli"** are lateral processes of styli bases situated on distiphallus surface laterally and parallel to styli known e.g. in *Phytosarcophaga* (Verves 1990b).

## ♀ terminalia

The females of Sarcophagidae are generally viviparous (larviparous), and only in a few cases ovoviviparous (e.g. in *Sarcophaga* s. str./ Eberhardt 1955/ or *Ptychoneura*/ Sanborne 1982/). The ♀ terminalia are therefore shortened (Figs 5, 101) and only *Chilopodomyia borageana* in Johnsoniini has a telescopic ovipositor (Lopes & Tibana 1984), this situation is explained by its predation on myriapodes.

**Tergite VI**. Its generalized form shows a complete transverse (diametrical) plate with a row of well developed marginal bristles (sometimes interrupted centrally). A secondary modality is the separation of this sclerite in the middle so that two lateral plates are present (in different Sarcophaginae, occasionally in *Sarcotachina, Eurychaeta* of Paramacronychiinae and *Synorbitomyia* of Miltogrammatinae). An elongation of the entire tergite is known in *Dexagria* (Paramacronychiinae) and in some Sarcophaginae (*Xanthobrachycema,* partly in *Oxysarcodexia* etc.), elongation of the separated lateral plates occurs in some Paramacronychiinae (e.g. *Angiometopa mihalyi*) and Sarcophaginae (*Robineauella, Pattonella* etc.). The 6th stigma (spiracle) is situated either on the surface of tergite VI laterally or in the membrane near its anterior margin. The 7th stigma (spiracle) is usually situated in the membrane laterally, only occasionally on the surface of tergite VII.

**Tergite VII** is generally rather similar to tergite VI, but smaller (e.g. in *Macronychia*). The secondary modality is its shortening, and the 7th stigma is situated either in the membrane of tergite VI or on its surface (this is characteristic of Miltogrammatinae and Paramacronychiinae). This tergite is also provided with a row of marginal setae, their secondary loss starts in the middle, and they can be completely absent (e.g. in *Taxigramma*). The secondary reduction of tergite VII follows in two ways. It is gradually reduced, desclerotized or is completely absent (in Parasarcophagina, Boettcheriscina etc.), or it separates into the setose lateral lobes which become gradually bare and the entire sclerite becomes membranous (Protodexiini, Raviniini, Johnsoniini etc.).

**Tergite VIII** is usually reduced, but it can also be present (in *Macronychia/Moschusa/* and in some Miltogrammatinae) in the form of a transverse bare membranous plate. In the majority of Sarcophagidae this tergite is reduced to two lateral membranous bare plates which are sometimes setose and a little more sclerotized. In *Macronychia* s.str. the lateral parts of tergite VIII are enlarged ventrally, surrounding the cerci, and are prolonged caudally to form a spinose ovipositor.

**Tergite IX** is always absent.

**Tergite X** (the anal plate of Rohdendorf 1937, the epiproct of McAlpine 1981) is usually a small membranous shortly setose plate with a pair of elongate bristles and it can be reduced partly or completely and the pair of the bristles may be absent.

**Signum** (possibly an immerse of the sternite VII) is the opening of the spermathecae. It is more or less sclerotized and present in some Paramacronychiina and in most Sarcophaginae. This structure is very little known, although it is very different in different species.

**Sternite VIII** is originally a transverse subtriangulate or rectangulate setose plate (e.g. in *Macronychia, Senotainia*). It can be secondarily partly desclerotized in its fore part, and provided with strong marginal bristles (in *Pandelleana*) or completely desclerotized and membranous (e.g. in *Eurychaeta, Dexagria, Varirosellea*), whereby its setae are also partly or completely reduced *(Ascelotella granulata, Bercaea).* It is rather minor in *Arachnidomyia.* In *Blaesoxipha* (Paramacronychiinae) and in some Emblemasomatini (Sarcophaginae) this sternite forms an elongate, laterally flattened ovipositor. In Protodexiini sternites VII and VIII are complete, forming the basal part of the ovipositor.

**Sternite VII** is primarily a moderately transverse sclerite completely covered by medium-length bristles (in Macronychiinae). It develops secondarily a row of hind marginal bristles forming possibly two lateral groups. These lateral bristles are, then, preserved in the form of a pair of lateromarginal bristles (in different sarcophagids). This sternite is completely bare in *Sarcotachina*. The form of this sclerite varies from transverse to square or elongate-rectangulate. In Protodexiini and in some Emblemasommatini this sternite forms the distal part of the ovipositor.

**Sternite VI** shows similar changes as sternite VII. Its general width corresponds to about 0.3 that of tergite VI in Paramacronychiinae (except Sarcotachinini) and in some Sarcophaginae (Impariini) representing a plesiomorphic situation (Lopes 1982a, Kulikova 1984, Verves & Kulikova 1986). Sternite VI is shorter and narrower in all other Sarcophagidae.

**Spermathecae**. All Sarcophagidae have primarily three uniform segmented spermathecae. Secondarily one spermatheca is reduced. Their original form is ovate or pyriform. They become elongate and kidney-shaped in *Pediasimyia*, or only their basal part becomes elongate. And finally retorted

spermathecae are present in Sarcophaginae.

The relation between the structure of the ♀ terminalia and the oviposition in calypterate Diptera was studied by Herting (1957) and by Verves & Kulikova (1986).

## Relations of Sarcophagidae to their hosts

According to Rohdendorf (1967) the relationship between flesh-flies and their hosts indicate that they represent a colateral group of calliphoroid flies (Calliphoridae s. lat.), since they have apparently developed as trophic competitors. The primary status of the larval feeding in both families is necrophagy, but the true sarcophagids prefer small animal carrion (Denno & Cothran 1975, Beaver 1977, Hanski & Kuusela 1980, Verves & Narchuk 1986, Pape 1987b etc.). The larvae of different calliphoroids develop in similar substrates, but their larvae hatch from the eggs not prior to but after (several hours) oviposition has taken place. The sarcophagids bear live larvae, this larvipary representing a positive selection value ("superearly populating"). The larvipary in flesh-flies resulted, thus, from breeding competition on similar substrates.

The (small) corpses of carrion represent a rather unsteady substrate exposed to the inponderable environmental changes, especially of climatic character, to feeding competition of vertebrates etc. The calliphoroid dipterans may use other suitable substrates for oviposition or larviposition. Therefore the non-specialized facultative feeding strategy including parasitism and predation seems to be the basic strategy of calliphoroids. And the necrophagous-parasitic or necrophagous-predatory strategy is one of the substantial feeding trends of both sister groups of Sarcophagidae – the Paramacronychiinae and Sarcophaginae. The flesh-fly species showing this feeding habit comprise the greatest part of the tribes of Paramacronychiinae and 8 of 11 tribes of Sarcophaginae.

A tendency for occasional cannibalistic predation and parasitism by the larvae of sarcophagids is due to their primary zoophagy: The 1st instar larvae developing in the ♀ "uterus" are capable of attacking each other during the larviposition or even the tissues of the larvipositing female. This phenomenon is known in purely necrophagous (predacious) (Portschinsky 1881) and parasitic taxa: *Wohlfahrtia magnifica* (Gan 1953) and *Blaesoxipha* (Léonide & Léonide 1986). Numerous larvae of schizophagous species are able to attack other larvae, especially as 1st instar maggots (Blackith & Blackith 1984). Such facultative predation resulted finally in obligatory predation (*Sarconeiva* and *Cuculomyia*, in Johnsoniini). The victims are moreover killed by extraintenstinal neurotoxins (Lopes 1973a). The next kinds of obligatory predation or parasitism in animals was due to their thin skins or wounds of and in host bodies. Therefore no special adaptations in both hypopharyngeal complexes of the 1st instar larvae and in the ovipositor (postabdomen) of ♀ flies was necessary.

The sarcophagine parasitism in earth-worms resulted probably as a secondary parasitism from (original) predation on worms living in decomposing organic substrates (the species of the genus *Sarcophaga* are obligatory or facultative parasitoids of earth-worms). The larviposition follows on coprolites of Lumbricidae. The larvae attack then the host inside its burrows and invade the worm's body through the opening of the clitellum (Eberhardt 1955).

The species *Notochaeta cognata* (Johnsoniini) lives similarly in the bodies of the earthworm family Macroscolecidae of South America (Lopes 1973a).

Facultative parasitism of terrestrial gastropods is known in several originally necrophagous sarcophagids. Some species are specialized predators or necrophages of snails: Cuculomyini *(Airypel, Malacophagomyia)* and Sarcophagini (several species of Phallanthiina). Obligatory parasitism in snails is known in Johnsoniini *(Johnsonia)*, Cuculomyiini *(Udamopyga)*, Sarcodexiini *(Encelimyia)*, Sarcophagini *(Heteronychia, Discachaeta, Krameromyia, Microplagia, Comasarcophaga, Sarcodexiopsis)*.

In the Paramacronychiinae the specific necrophagous-predatory species are also known *(Eurychaeta, Nyctia)*. The females splash their larvae into the respiratorial opening of the snail (Verves 1976b) or lay them on the epiphragma (Neck & Lopes 1973).

Obligatory predation in egg sacs (cocoons) of spiders is known in *Arachnidomyia* (Phallanthina) and *Parasarcophaga (Baranovisca)* of Parasarcophagina. The origin of this habit is unknown. The females lay probably the egg(s) on the surface of the sac or cocoon and the larva penetrates it with the aid of numerous and strong spines on their first segments.

Some paramacronychiine species (of *Oophagomyia, Wohlfahrtia, Sarcotachina*) are necrophagous, but they facultatively predate on egg sacs (pods) of grasshoppers.

Facultative and obligatory predation on prepupae and pupae of Lepidoptera is well known in numerous species of different sarcophagine subfamilies and tribes. The species of the paramacronychiine genus *Agria* are facultative *(A. monachae)* or obligatory lepidopterous predators *(Agria housei, A. punctata), A. mamillata* is specialized on caterpillars of *Yponomeuta*. Numerous facultative predators attack pupae especially during lepidopterous peak gradations (e.g. *Liosarcophaga harpax, Robineauella pseudoscoparia, Kramerea schuetzei, Boettcheria* spp.). Obligatory predacious species are *Emdenimyia, Harpagopyga, Sarcodexiopsis* of Johnsoniini, *Idoneamima houghi, Liopygia uliginosa, Liosarcophaga subharpax* of Sarcophagini. Unlike the Tachinidae, the maggots of sarcophagids are unable to penetrate bodies of actively moving caterpillars but only on immobile prepupae or pupae (Vasiliev 1913).

Facultative myiases of vertebrates are caused by several species of Sarcophagina and Paramacronychiina (especially *Wohlfahrtia*). Such larvae are found either in wounds or they invade the eyes, nasopharynx, uretral and genital ducts. The females deposit larvae on mucous membranes, body openings or in wounds. Sarcophagid obligatory parasitic species of vertebrates are not numerous: *Wohlfahrtia meigeni* and *W. vigil* cause cutaneous myiasis in amphibians, reptiles, birds and mammals. *W. magnifica* attacks warm blooded animals – mammals and birds. Among sarcophagines specific myiasogenic species attack the frog *(Notochaeta bufonivora)*, the chamaeleon *(Anolisomyia blackae)* and the turtle *(Cistudinomyia cistudinis)*. Unlike the blood-sucking Calliphoridae, only schizophagous sarcophagine species may attack bird nestlings.

Several species show a wide spectrum of larval feeding from schizophagy to predation and facultative parasitism of both invertebrates and vertebrates: *Ravinia pernix* (Raviniini), *Hystrococnema plinthopyga, Kellimyia kellyi* (Impariini), *Helicobia monionella, H. rapax, Sarcodexia innota* (Sarcodexiini), *Helicophagella melanura, Pierretia nigriventris, Bercaea cruentata, Liosarcophaga* s. str. sp. div., *Parasarcophaga* s.str. sp.div., *Boettcherisca* spp. etc. (Sarcophagini).

The predation and parasitism by sarcophagids in animals with soft skin developed independently in Sarcophaginae and Paramacronychiinae, based on gradual widening of the trophic spectrum and on different facultative tendencies. The obligatory predation or parasitism is known only at species or genus level. Only the tribe Johnsoniini comprises parazitoids of animals with soft skin or body cover. The kind of feeding may also depend on the size and character of the host. In small hosts the larva develops as a parasite and after killing the host it attacks another individual or other host.

The feeding specialization results in specific necrophagous or coprophagous strategies. Besides specific necrophages of snails also specific necrophages of insects (*Xinopiella, Phallantha* etc.) and of small vertebrates are known (*Ascelotella*, some species of *Robineauella, Liosarcophaga, Sarcorohdendorfia* etc.).

The sarcophagids are more or less thermophilic flies unable to utilize their feeding substrates and hosts at the start (early in the season) or at the end of the vegetation period – similarly as Heleomyzidae, Scathophagidae, Calliphoridae etc. To avoid the competition with other schizophagous flies they have often adapted to certain special environments: sea shores and fresh water habitats, on carcasses of aquatic or amphibious animals: Goniophytoini (of Paramacronychiinae), *Abapa* (Inpariini), *Alisarcophaga, Adiscochaeta, Paraphrissopoda* (Sarcodexiini), *Parasarcophaga (Sinonipponia), Takanoa* (Sarcophagini of Sarcophaginae). Some larvae develop in the galleries or borings of insect larvae and plant stems, in ant, termite, bee nests (*Dexosarcophaga, Farrimyia, Panava* of Cuculomyini, *Notoecus, Metoposarcophaga, Tripanurga* of Sarcophagini). The predatory life of *Brachicoma* (Paramacronychiini) in nests of bumblebees has probably developed from its original necrophagy similarly as the larval inquilinism in sphecoid and vespoid nests by *Raviniopsis* (of Sarcodexiini), *Neobellieria affecta, N. polistensis* of Sarcophagini. Also the vertebrate egg parasitism in sea turtles by *Eumacronychia sternalis* might be of a similar origin. Other species of *Eumacronychia* are nest inquilines of sphecoid wasps. The females larviposit on the sand surface and the larvae penetrate the nests of the host. In the habitats where turtles lay eggs a similar habit has led to parasitism.

A special form of necrophagy is that of feeding on the insects trapped in the proteolitic fluids of pitcher plants. This habit occurs in the genus *Fletcheromyia* (Impariini), *Sarracenomyia, Sarcosolomonia* and some species of *Pierretia* (Sarcophagini).

Obligatory coprophagy is known in some Sarothromyiini (*Nephochaetopteryx*) and in the majority of Raviniini. It seems that the necrophagy developed in those species which attacked carcasses at a late phase of their destruction by necrophagous insects. But such species were originally attracted by carcasses as substrates rich in proteins.

The parasitism by sarcophagids of insects and other arthropods (mainly myriapods and scorpions)

with well sclerotized exoskeletons originated probably from their necrophagy habit combined with an ability to penetrate the host's protective cuticle. The females have developed a sclerotized ovipositor, and the 1st instar larvae have powerful mouthparts. The species also show special ethological reactions during oviposition. J. Léonide (1969) proposed a classification of this behaviour based on the larviposition on grasshoppers which may be well applied (perhaps with minor modifications) to all kinds of parasitism on hosts with sclerotized cuticle.

General larviposition on the host`s body may occur without any specialization of the ovipositor. This situation exists in numerous facultative parasites (e.g. *Kallymyia kellyi, Sarcotachinella sinuata*) and in certain obligatory parasites (*Blaesoxipha redempta, B. unicolor, Opsophyto opifera, Servaisia aculeata* etc.) attacking grasshoppers and in some species of Emblemasomatini attacking cicadas. The larvae search actively after the intersegmental membranes, genitoanal openings etc. to penetrate them. The larviposition follows usually while the host is sitting or creeping, but is sometimes (*Blaesoxipha redempta*) on flying grasshoppers. *Concoldamyia auditrix* locates its host – the singing males of cicadas – by the sound of their songs (Soper & al. 1976).

A step towards a specialized infestation was the larviposition directly into a body opening of the host. This behaviour resulted in the specialization of the ovipositor into a larvipositor and in completing the ethological reactions of larvipositing females. The females of some *Agriella* larviposit into the mouth opening of tenebrionid beetles. Their ovipositor is short, but the abdominal sclerites are elongate forming a tube. The parazitoids of orthopterans larvipositing on the mouth opening (*Servaisia arteagai*) or on the genitoanal opening (*Blaesoxipha plumicornis, B. pygmaea, Servaisia neuguenensis, S. varisi* etc.) have a spatulate or spine-shaped, apically rounded larvipositor. The next parazitoids of the orthopterans attack their hosts by piercing their cuticle with a spine-shaped, pointed larvipositor. *Blaesoxipha atlanis* pierces the femoral base, *Servaisia falcicornis* the hind femora, *S. rossica* the abdominal membranes.

The sarcophagids parasitizing these arthropods with sclerotized cuticle form a compact systematic group. The tribe Protodexiini comprise the parasitoids of orthopterans *(Blaesoxipha, Servaisia,* the subgenera *Servaisia, Acridiophaga, Amblyocorephenes, Neotephromyiella, Opsophyto, Protodexia* and *Tephromyia),* of tenebrionid beetles *(Acanthodotheca, Agriella),* of mantids *(Mantidophaga).* All parasitoids of cicadas belong to the tribe *Emblemasomatini.* The obligatory parasitoids of arthropods belonging to different tribes are members of specialized genera: The parasitoids of the myriapods belong to *Spinobolomyia* (Impariini), the grasshoppers are attacked by *Phallocheira* (Sarcophagini), the scarabeid beetles by *Wohlfahrtiopsis* (Sarcophagini). The only obligatory paramacronychiine parasitoid of orthopterans *Blaesoxiphella brevicornis* represents a separate subtribe.

The inquilinism (cleptoparasitism) of Macronychiinae and Miltogrammatinae in solitary Hymenoptera Aculeata is secondary and has evolved probably from endoparasitism in insects (Verves 1976, 1983). This theory is based on the observations by Baranov (1925). Locusts parasitized by larvae of *Blaesoxipha* spp. were often attacked by sphecoid wasps *(Sphex).* These wasps paralyse the locusts on which they lay their eggs. The blaesoxiphine larva is not killed during this process, but it obviously does not resist the competition with the sphecid larva. It seems that the ancestral miltogrammatine form parasitizing the insect larvae frequently paralysed (and later fed on) by sphecoid larvae were repeatedly transported to the sphecoid nests together with these paralysed larvae. The miltogrammatine larvae might have fed on the sphecoid larvae together with the paralyzed insect host larva. This inquilinism has certain evolutionary advantages, since the parasitoid miltogrammatine larva is more protected by its inquilinism against different environmental factors.

The origin of inquilinism is also combined with certain special behavioural reactions of larvipositing females in host's nests. Several degrees of such reactions are recognized:

1. Attacking the host wasps (Sphecoidea and Pompiloidea) during the transportation of the paralysed insects into their nests. The flies sit on exposed sites (stems, stones etc.) and chase flying insects of a certain size.

If they find a wasp carrying a paralysed insect, they quickly larviposit (on the paralysed insect) as the wasp is pulling it into the nest, or the larvipositing fly follows the wasp into the nest and deposits its larva on the body of the paralysed insect. It has been observed by several authors that some females try to larviposit on the paralysed insect being carried by flying wasps (Spassky 1915, Krombein 1967, Kurczewski 1964, Myarzewa 1972, Hager & Kurzewski 1985, Daniels 1977, McCorguodale 1986, Spofford et al. 1985 etc.).

2. Larviposition takes place in the host nest when host is absent. This behaviour is characteristic

in Amobiini developing in earthenware "jugs" of some sphecoid and eumenid wasps (Krombein 1967). Also the majority of the species of the subtribe Miltogrammatina and some species of Metopiina show this strategy in attacking apoid hymenopterans (Allen 1926, Wcislo 1984 etc.). The females of *Phrosinella (Euhilarella)* larviposit at the same time as the entrance to the wasp nest is being closed. The fly larvae may penetrate the burrow independently (Ristich 1956, Evans 1970). Our own observation (Verves in the Nature Reserve of Kanev near Kiev, Ukraine, 1985) was on the female of *Macronychia striginervis*. The wasp nest was situated in the burrows of the anobiid beetles in the wall of a wooden building and closed by a mixture of sawdust. The female pierced the closure with its acute larvipositor and released the larva into the nest, where it was later detected.

3. The larviposition occurs directly on the body of an aculeate wasp. This is a rare case observed in the female of *Ptychoneura aristalis* when larvipositing on a sphecid wasp whose nests are in stems. *Metopia argyrocephala* larviposits on pollen clumps on the legs of apoids (bees).

Numerous observations show that miltogrammatines feed on paralysed arthropods only as 1st and 2nd instar larvae, whereas the 3rd instar larvae are necrophagous (Spassky 1915, Allen 1926, Ristich 1956, Charykuliev & Myarzeva 1964, Evans 1970, Krombein 1967, Kurczewski & Spofford 1986 etc.). A similar behaviour was observed in *Senotainia tricuspis* (Boiko 1948). Such observations might indicate that the ancestral inquilinism has probably developed from non-specialized parasitism. It seems to be a secondary adaptation to the environment of the solitary wasp nests. This adaptation by the majority of the miltogrammatine species resulted in widening the scale of host species. It seems that the dominant instinct is the penetration of the host nest, and that the host species is of secondary importance in miltogrammatine species. The majority of species of *Senotainia* penetrate nests of wasps storing very different insects and spiders, but their larvae can successfully develop also in dead bees or flies in the nests of *Philanthus* or in Bembicini. The widening of the feeding spectrum led gradually to the facultative *(Senotainia, Metopia)* and later to the obligatory inquilinism of bee nests (the majority of species of the subtribe *Miltogrammatina*). The larvae feed on pollen, honey and bee larvae (Allen 1926, Dochkova 1982, Ganagin et al. 1985 etc.). A narrowed feeding spectrum reflects in specialised inquilinism. The species of *Pterella* are inquilines of *Cerceris* spp. The larvae of *Metopia italiana* develop in nests of *Oxybellus* on paralysed flies. They may also feed on flies of their own species stored by the host (so-called "alleloparasitism" – Grandi 1959).

The inquilinism of larvae of some highly specialized sarcophagids in nests of ants (*Paragusia*/ Metopiini/ and *Dolichotachina*/Phyllotelini/ and termites (*Lampometopia, Hoplacephala*/Phyllotelini/) is not yet cleared due to the rare observations. It is known that the larvae of *Hoplacephala schistacea* feed on the mycelia in the "mushroom gardens" in termite nests (Cuthbertson 1937) and that the larvae of *Termitometopia skaifei* suck the liquid secreted by the termites during the trophallaxis (Skaife 1954). This might have resulted from the inquilinism, as the females larviposited into the nests of the hosts.

The miltogrammatine females larvipositing on the flying wasps can probably larviposit also on other flying insects, particularly bees. In such cases the larvae penetrate the host body through (pleural) membranes, resulting in secondary parasitism (observed in *Senotainia tricuspis*).

Artamonov (1983, 1987) believes that sarcophagids have numerous preadaptations and show selective advantages to occupy structurally very complex ecosystems due to their ecological plasticity. The necrophagous-predatory feeding strategy of numerous species enables them to feed in different trophic substrates according to their availability. A similar plasticity exists in inquilinic species. The majority of miltogrammatines may feed on a variety of hosts in different aculeate nests according to their habitat availability.

Generally, the larviparous flesh-flies show a considerable fecundity (20-30 up to 300-400 larvae). They deposit their larvae very effectively for survival. All the above feeding strategies show that the flesh-flies belong with the so-called K-selection insects.

## Appendix I

During the press of this paper some additional sarcophagine taxa have been discovered in Central Europa:

1. *Helicophagella macrura* (Rohdendorf, 1937) – a rare taxon known from the Tisza Basin in eastern Hungary was found in the extreme South of Slovakia (Modry kamen-Hegyfárok) on the Danube (see also Povolný 1989).

2. *Helicophagella inopinata* (Rohdendorf, 1937) has been described by Mihályi (1979) as *Helicophagella hortobagyensis* from the Hortobágy Region in eastern Hungary.

3. *Pseudothyrsocnema spinosa* (Villeneuve, 1911) which is also known from eastern Hungary (Tisza Basin) is a mediterranean taxon accompanying especially humid and warm habitats (especially reeds) and indications exist that this species might be present in the Neusiedler See territory.

4. *Heteronychia taurica* (Rohdendorf, 1937) lives in the eastern limestone Alps near Lunz (leg. Povolný, June 1991).

5. *Heteronychia cepelaki* (Povolný & Slamečková, 1970) distributed in the Slovakian and Ukrainian limestone Carpathians lives also in the Lunzer Alpen and in the Kärntner Alpen.

6. *Sarcophaga novaki* (Baranov, 1941) is rather common also in the limestone Alps near Lunz at elevations above 1.500 m.

As for the involvement of Sarcophagidae, especially of several synanthropic taxa of the subfamily Sarcophaginae, in human and veterinary parasitology, hygiene and epidemiology, the reader is referred especially to the monograph by Greenberg et al. (1971), where also numerous references to the special literature are found. Therefore no special attention is devoted to this topics in this paper.

Concerning the synonymy of taxa treated in this paper we refer the reader to the Catalogue of Palaearctic Sarcophagidae (Verves 1986), in which the essential synonyms of this group have been yet presented. The synonyms presented in this paper should only draw the attention either to such names which were frequently used in the past or which involve species of some special (e.g. economic) importance. Several new synonyms are also indicated.

7. Quite recently, *Sarcophaga palavae* Povolný, 1993 has been described from a ♂ collected on the hilltop of the Pavlovské vrchy Hills in southern Moravia in August 1992. this description (dated 1993) has been published only recently (October 1995), and the species appeared to be somewhat controversial or uncertain, as only the holotype ♂ was known (considering the fact that the majority of the species of this genus are very common). On October 24, 1995, another strictly conspecific ♂ was collected on a loess hilltop above the village of Ujezd, about 12 km E of Brmo and about 40 km N of the habitat of the ♂ holotype. The males of this species are unambiguously characterized by a very short, deeply excised (concave) cercus and by a very shortly compressed and stout distiphallus. These two most important characters make it possible to discern and differentiate this species immediately from all other known species of this genus. It appears that an obviously rare species is involved, since several tens of thousand specimens of the sympatric species of *Sarcophaga*, viz. *S. variegata*, *S. carnaria*, *S. subvicina* and *S. lasiostila*, were systematically collected in this territory during the last two decades. Although genitalia characters are decisive of the identification of this taxon, no examination of genitalia appears to be necessary if the postabdomen (genital segments) is correspondingly handled during dry preparation of the male, this making the form of the cercus and distiphallus clearly visible even in dry specimems.

8. According to Pape (1995), *Heteronychia boettcheriana* (Rohdendorf 1937) (Fauna SSSR 1937, 19 (1): 345/ *Pierretia*/) is a junior synonym of *Heteronychia* (s. str.) *bulgarica* (Enderlein 1936) (Mitt. Kgl. naturw. Inst. Sofia 9: 100/ *Helicobia*).

## The hilltopping in flesh-flies

Most sarcophagid species, especially those of their subfamily Sarcophaginae and practically all members of their tribe Sarcophagini, have developed the so-called hilltoppinging strategy (Povolný & Vácha 1988), which enables the sexes to meet. Flesh-flies show rather limited sound communication and scent attraction, both of which are probably effective at short distances only. In this respect their optic orientation prevails. The population density of their parasitoid or predacious maggots is rather low (for instance about 5 % earth-worms are parasitized by the maggots of *Sarcophaga* spp.), which fact, together with the considerable dispersion of these maggots in their habitats, makes the meeting of sexes after hatching rather difficult. Flesh-flies are comparatively strong short distance fliers, but they have developed so-called hypsotaxy enabling them to use thermic air current to reach prominent landscape configurations and especially hilltops. The most favourable hilltops are either isolated individual hills, hills above south-facing slopes arising from valleys, or ranges above southern slopes configured like an amphitheater. In deep canyons, hilltopping usually takes place on prominent south-facing rocks or rocky blocks. Hilltopping also occurs in towns and cities on prominent buildings, in tree crowns of city parks, etc. In the hilltops the males perch in sunlit vantage points, exposed dry plants and especially dry branches or pieces of wood lying on the ground, prominent stones, corner stones, tree trunks, wooden or concrete constructions, paths, etc. Up to several hundred males may gather in such hilltopping aggregations. In view of such high densities it is easy to observe their interactions which are incomparably less often observed outside the aggregations. Perching on their vantage points in full sunshine, the males take off at interval of several seconds for short flights, usually forming a horizontal or vertical loop several tens of centimeters long. This happens even without any external stimulus, but usually a male will take off whenever another individual flies by its perching site. The male takes off to pursue the rival for several seconds, then returning to its original perching site. During the pursuit an aerial combat may frequently follow as a rule, the two males hovering in flight, facing each other or flying round each other, and they eventually grip each other with their legs and/or finally genital claspers (so-called pseudocopulation) and may even temporarily drop to the ground before they separate. After having returned from a longer aerial combat the male usually brushes (its head and forelegs) and during this time it usually will not be provoked even by a rivalling male that might try to attack it in flight or even by touching its back. This ♂ activity apparently correlates with several purely external factors, such as sunshine, air temperature, air currents and wind, and it also reflects the actual disposition of the male. Especially fit males usually stay longer on and return more frequently to their favourite perches. It seems also that males occupying such "mini-territories" for a longer time are predetermined to become the winners of the aerial combats before they disappear in collective swarming or during mating. Distinctly small individuals or species mostly succumb the combats and are either expelled from the most favourable perching objects or they occupy their own stratum usually sitting on the ground in dense dry vegetation. It is therefore necessary to capture primarily such strong individuals in order to obtain a true picture of the species composition of a particular hilltopping aggregation, because smaller taxa are usually captured when big individuals are absent. And it may take several hours before the smaller individuals start to prevail. This ♂ behaviour in flesh-fly aggregations is a strong indication that the perching strategy involves territorial behaviour. With increasing daily mean air temperature, still more and more males are engaged in these aerial combats and during the temperature peak after noontime innumerable aerial combats result in a mass swarming as each male pursuits any other to be itself immediately attacked by another male or males. The returns to and take-offs from the perching sites last only fractions of a second. The pseudocopulations preceded by hovering, facing and flying round each other and gripping with subsequent drops to the bottom become more frequent and the drops may last for several seconds. In other instances no bodily contacts result from the aerial combats or they are very short. The number of males bursting out without any obvious external stimuli to sudden loopings also increases during sultry period. At extremely high temperatures during intensive sunshine, combined with drought (characteristic of midsummer in arid/or semiarid habitats), distinct flight inhibition is generally observed in most insects. The males of flesh-flies with their chequered abdominal pattern continue their activity, however. Willmer (1982) explained this flight behaviour in that this chequered abdominal pattern shows increased light reflecting properties prohibiting surface overheating and, moreover, the flesh-flies may alternately pump the haemolymph between thorax and abdomen, these two mechanisms being responsible for this optimal thermoregulation.

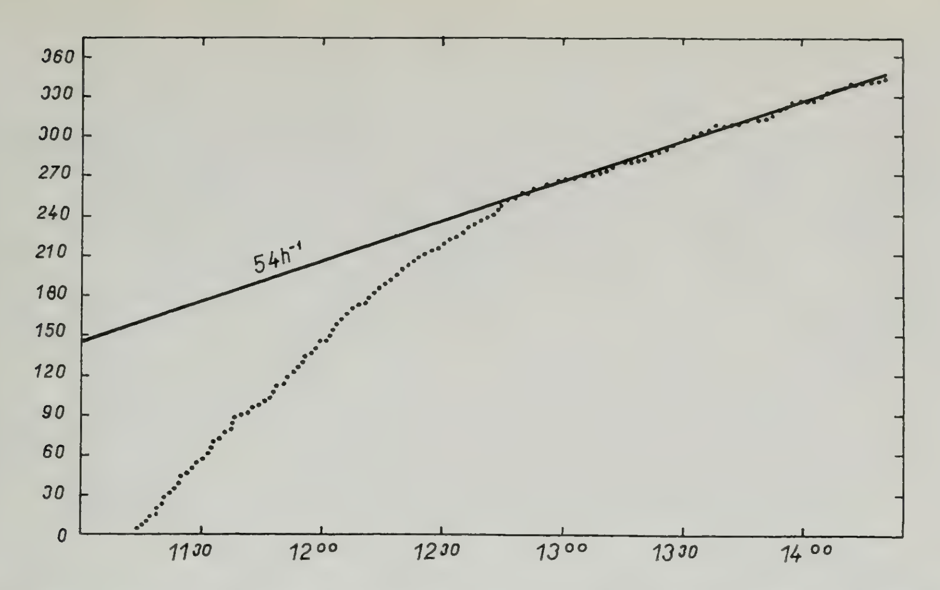



**Fig. 1.** Netting course of flesh-fly males in the hilltop of Tabulová hora Hill, southern Moravia, on June 6th, 1985, demonstrating the two fractions of the males, the first comprising probably the males behaviorally established in the hilltop aggregation since previous day(s). The second fraction comprises less frequent arrivals of males reaching the aggregation later and gradually after hatching. The aggregation comprised about 150 individuals.

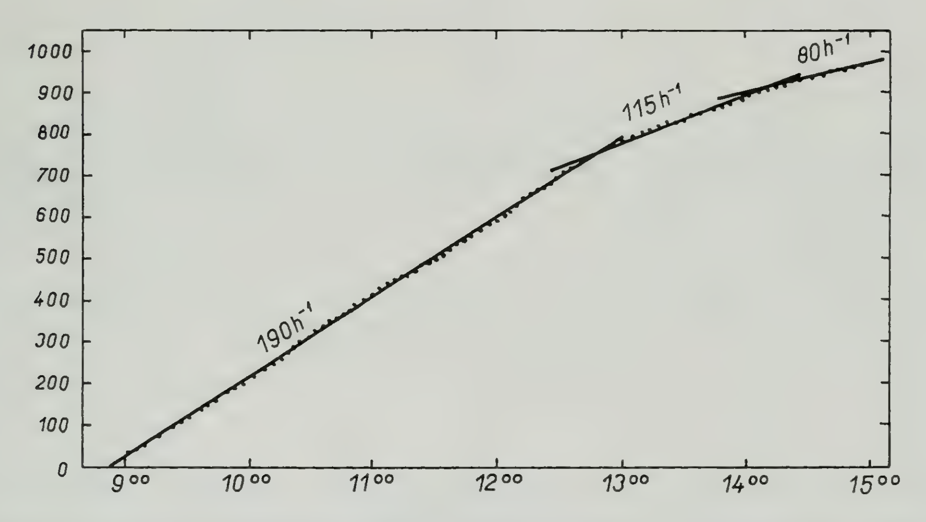



**Fig. 2.** Netting course of flesh-fly males in the hilltop of Straník (near Žilina, central Slovakian Carpathians), on July 21st, 1986. It shows that nearly four hours capture was necessary to comprise all the males of the first fraction and that the arriving males of the second fraction became increasingly rare. The aggregation comprised nearly 700 ♂♂.

The function of the ♂ preconnubial behavior in hilltopping aggregations is still not satisfactorily cleared. Tentative dissections of ♂ reproductive organs indicate that the freshly hatched males tend to ascend their preconnubial aggregations soon after hatching when they are not yet fully sexually mature.

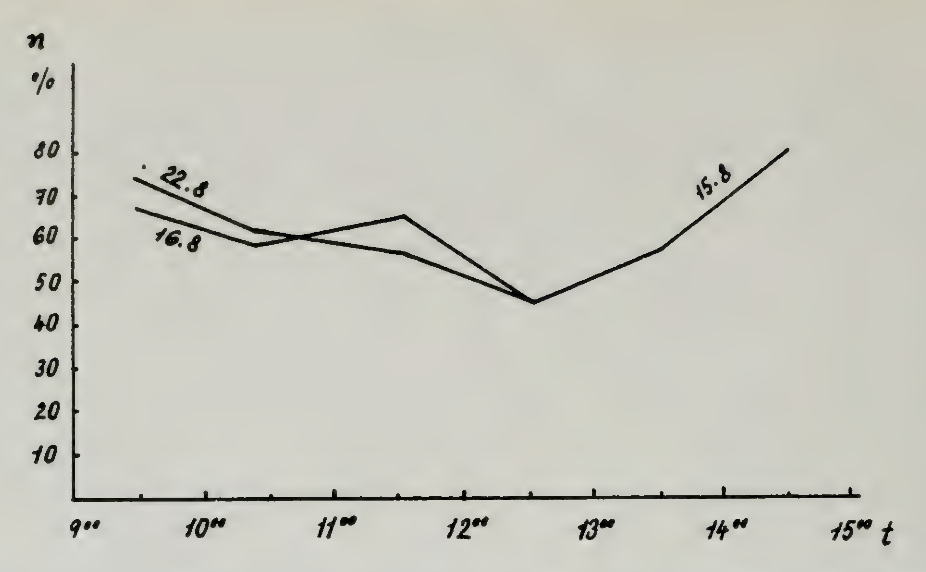



**Fig. 3.** Variation of ♂ percentage returning to their perching sites after aerial combats. Three independent observations evidence that the number of the "returns" decreases during the noon time. This also reflects the increasing number of the aerial combats with the increasing daily temperature.

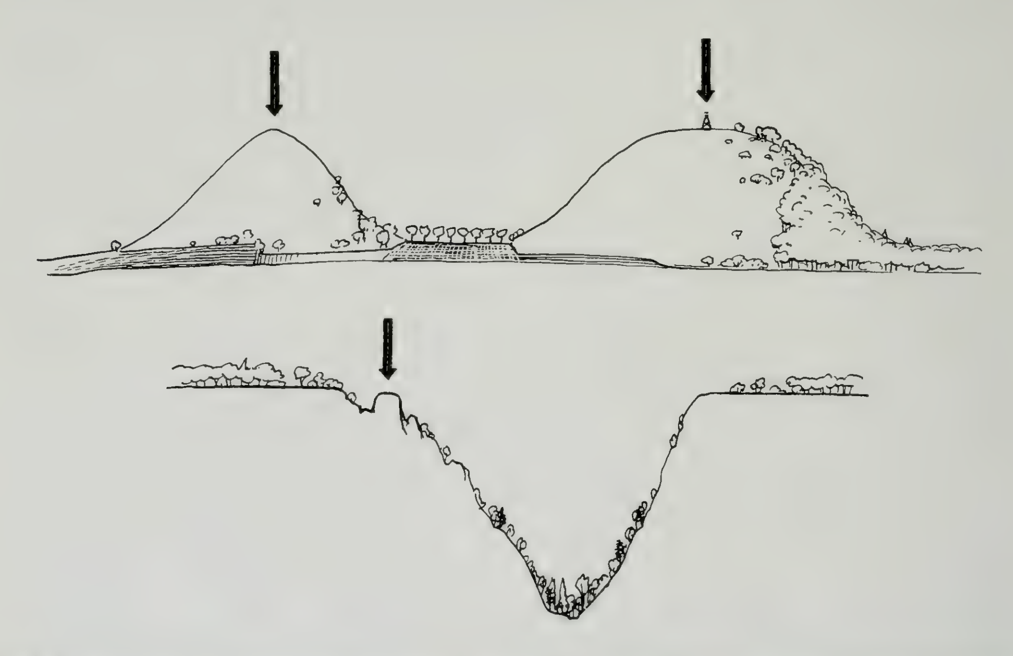


**Fig. 4.** Preconnubial hilltopping aggregations are found e.g. on isolated tertiary volcanoes arising like islands from the central Bohemian plains stretching along the riverbed of the Vltava River. Their northern slopes were originally forested, whereas on the southern slopes a partly xerothermic forest steppe vegetation has developed. Extensive pasture reduced this vegetation either totally (above left) or partly (above right). The hilltops, especially their wooden constructions, are very characteristic of flesh-fly ♂ hilltopping enabling to collect very representative flesh-fly samples both faunistically, ecologically etc.
In deep canyons (here a schematic cross section of the famous Canyon of Zadiel in eastern Slovakian Carpathians) the flesh-fly ♂ preconnubial aggregations gather mainly on the prominent limestone cliffs and rocky blocks arising from the canyon slopes.

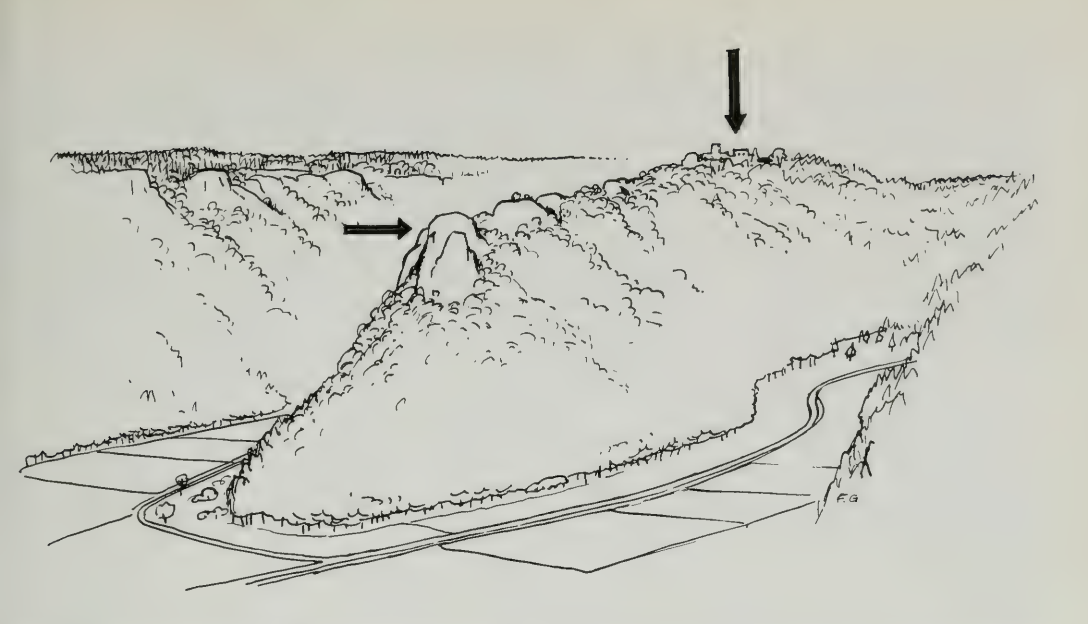


**Fig. 5.** A very characteristic situation of the flesh-fly ♂ hilltopping shows the southern facing range of the Muráň Plateau (in central eastern Slovakia) with the ruin of a middleages fortress. The hilltopping concentrates mostly on the ruin tops and especially on the tops of the prominent limestone rocky block called "Cigánka". In such situations the rare or endemic flesh-fly taxa accompanying the Carpathian forest belt were discovered.

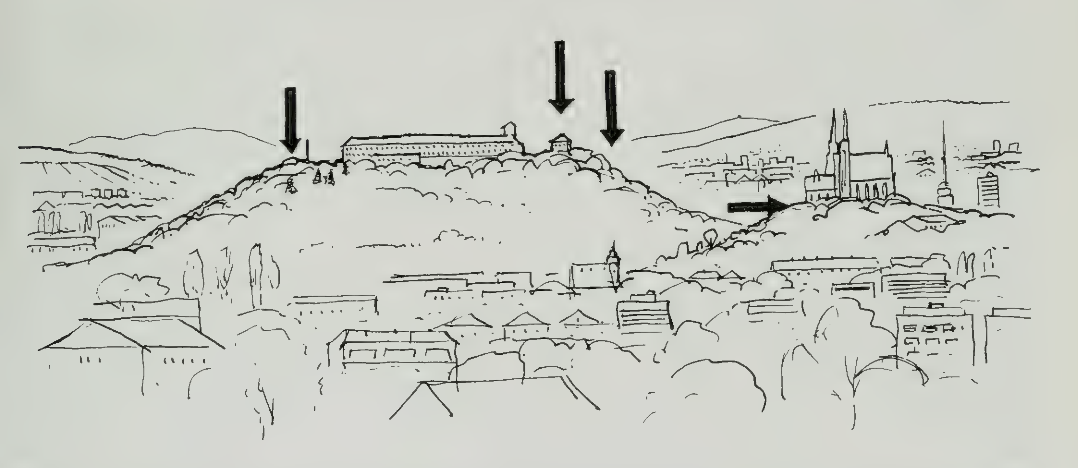


**Fig. 6.** The hilltopping may be exhibited also in human agglomerations including towns and cities. This schematic view shows the silhouette of the Moravian capital Brno with the prominent buildings of the ancient fortress Špilberk and the Gothic Cathedral of St. Peter. Both are situated on hilltops where sarcophagid ♂ aggregations are found. In such situations especially culturophilous and synanthropic flesh-fly taxa reflect the secondary changes of the urban environment and they enable to use such taxocenoses as models in synecological studies and observations.

With the increasing number of the aerial combats and with the increasing participation on the swarming described above, also the sexual activity combined with somatic contacts (obviously dependent upon daily mean air temperatures and radiation) increases distinctly. It seems that at least several hours or possibly even few days of such activities are necessary for a male to be fully sexually active. This situation is especially stressed by the fact that systematic netting of ♂ flesh-flies in the

hilltops, repeated in different habitats, resulted in the differentiation of the males into two fractions. The first fraction comprises the majority of males captured approximately during the first hour of netting (their number depends on the density of the aggregation) and is represented by the steep (concave) part of the corresponding curve. The second fraction, represented by the longer and practically linear course of the curve, comprises less numerous individuals captured stepwise within a longer time span. It seems that the first fraction consists of males established in the hilltopping aggregation for at least several hours, at most since the previous day. This is supported by the fact that the few males from several tens of marked males recaptured in the hilltops were still comprised in the first fraction. Although the recaptures are very rare (obviously due to high mortality of males exposed, among other things, to bird predation, etc.) it appears that individual males may survive up to three weeks. Usually several marked males can be observed staying in an aggregation for three to four days.

The perching and swarming of males results finally in seizing a female as it passes the aggregation with the support of thermic air currents, and in mating. Copulation follows on shrubs etc. and usually lasts several hours, and a female may be fertilized twice to three times. The above temperature and radiation dependent rhythms of male flesh-flies usually start at 9.00 h and last up to 17.00 h on warm and sunny days with daily mean air temperatures above 15 °C. Such external conditions prevail in the (second) half of April up to the (second) half of October. Additional and more detailed data were published by Rohdendorf (1937), Willmer (1982), Povolný & Verves (1987), Povolný & Vácha (1988), etc.

### The most important flesh-fly taxocenoses of central Europe

The long-term investigations in the flesh-flies of central Europe and especially the discovery of their hilltopping revealed new approaches towards their synecology. Starting with 1954, but especially after 1970, the systematic sampling of the ♂ sarcophagid associations has been developed comprising about 150 selected habitats (hilltops) in a cross section of central Europe between Hortobágy (in Hungary), Slovakia, Moravia, Bohemia and Thuringia including the corresponding declivities (e.g. from southern and eastern Slovakia to the central and northern Slovakian Carpathians including the High Tatra; from southern Moravia to the Jeseníky Mts.; from Central Bohemia to Šumava Mts. etc.). During the repeated samplings comprising about 2,500 collecting days and approximately 250 thousand individuals about 100 taxa of the tribe Sarcophagini were collected. These data were gradually completed by additional collections of the flesh-flies in the Austrian Alps (near Lunz am See, partly in Bavaria), in Bulgaria (1958-1987), Dalmatia (1990-1991), Greek Macedonia and Thessalia (1991-1994), Katalonia (1994-1995) and Sardinia (1995).

All these data are deposited in a date base treated in the Centre of Mathematical Statistics in Biology, Faculty of Medicine, Masaryk University, Brno.

The long-term study of the hilltopping aggregations makes it possible to compile the following review characterizing the sarcophagine associations accompanying the most important phytocenoses of central Europe as they have been characterized by Zlatník (1963). This compilation is based on the dominant and/or subdominant taxa characterized consequently by their density and incidence and, on the other hand, on the occurrence of the stenoecious taxa accompanying these associations. The next consequence of this approach is that the euryoecious taxa (and partly also culturophiles and synanthropes) are irrelevant for such characterizations. For example the euryoecious parasitoids of the earthworms, viz. *Sarcophaga variegata, S. carnaria* and *S. subvicina* should be excluded due to their obvious culturophily responsible not only for their vast horizontal distribution, but also for their considerable hypsometrical plasticity. This ecological plasticity of such taxa causes that it is virtually impossible to define their original ecological niches.

A special problem offer comparatively euryoecious species accompanying the (transpalearctic and partly holarctic) forest belt representing the most generalized vegetation cover of (central) Europe due to the postglacial history of its nature. These are especially such taxa as *Robineauella caerulescens, Liosarcophaga similis, Kramerea schuetzei.* These taxa accompany, at the same time, nearly all forest vegetation tiers being, however, focused only in their preferred niches. Numerous forest taxa of this group are obiously endangered and gradually vanishing. These are especially *Rosellea uliginosa, Digitiventra pseudoscoparia, Liosarcophaga tuberosa, Kramerea schuetzei, Liosarcophaga harpax,* all being parasitoids of bombycoid caterpillars. It appears that the forest belt taxa are, at least in central Europe,

generally more endangered (probably by the large scale impact of acid rain, heavy metal, organic residua – especially PCB – etc.) than xerothermophilic species surviving in habitats similar to the forest steppes, in steppe-like or in similar habitats. Moreover, this phenomenon is corroborated by the occasional invasions to the north of the (pontico-)mediterranean element from the Mediterranean and especially from the European southeast via Danube Basin. Such examples represent for instance such blowflies as *Chrysomyia albiceps* or such butterflies as *Colias erate*. Numerous indications exist that also some synanthropic flesh-flies offer similar examples: *Liopygia crassipalpis* individually penetrating southern Slovakia, Lower Austria and southern Moravia in the past has recently reached the southern suburbs of Moravian Brno and it has established there a surviving colony. *Liosarcophaga jacobsoni*, an essentially mediterranean taxon, has expanded along the European strands up to the Scandinavian coutries, *Liosarcophaga tibialis* occurs occasionally along the railway routs in Hungary and may reach southern Moravia.

**Vegetation tier 1 – oak tier**

This vegetation tier has a special hydric series of inundated lowland forests (Fraxini *Querceta roboris*, various formations of Ulmi *Fraxineta* and Fraxini *Alneta*). These formations are represented by such remnants of natural forest stands as the surviving lowland forests of the Danube and its (left side) tributaries of Morava, Váh, Hron, Tisza etc. The dominant flesh-flies are *Sarcophaga lasiostyla* (especially in warm oak stands), *Heteronychia dissimilis*, and – less common or only locally common *Heteronychia haemorrhoa* and *H. boettcheriana*. Of stenoecious and extremely characteristic species especially *Ascelotella granulata, Pierretia villeneuvei* and *Heteronychia rondaniana* should be mentioned. Of rare taxa especially *Heteronychia haemorrhoides* is characteristic of the warm forest stands in the riverbed of the Danube, and *Thyrsocnema spinosa* accompanies the extensive *Phragmites* stands in the Tisza region and further to the south. In the lowlands of western Europe especially *Discachaeta pumila* is characteristic – a species which forms extrazonal populations above the timberline of the Alps and Carpathians.

The oak tier proper (s.str.) (Carpini *Querceta*, Querci *Acereta* and Corni *Querceta*) with such individual trees as *Quercus pubescens, Quercus cerris, Fraxinus ornus* or such shrubs as *Cornus mas* and *Staphylea pinnata* is accompanied by extremely thermophilic (pontico-)mediterranean taxa and populating especially Hungary, Lower Austria, southern Slovakia and southern Moravia reaching there their extreme nortwestern distributional limits. A very fine example offers the thermophilic vicariating dualspecies *Liosarcophaga emdeni – L. teretirostris*. The first shows the eastern-mediterranean distributional pattern, the second is atlantomediterranean this distributional pattern being similar e.g. to that one of the crow *Corvus corone corone* and its eastern counterpart *C. corone cornix*. This distributional pattern is usually explained by the glacial period separation of an originally homogenous taxon. The typical representatives of the (pontico-) mediterranean element expressed especially in limestone- and loess formations are such parasitoids of the helicid snails as *Heteronychia mutila* (reaching its northern limits in southern Slovakia), *Discachaeta cucullans* (with its extreme northern habitat in the Pavlovské vrchy Hills of southern Moravia), *Heteronychia filia* (increasingly rare in the Bohemian Karst or in the shell-limestones of Thuringia etc.). *Discachaeta arcipes*, a generally thermophilous western-palearctic species, is also characteristic of such habitats. Of (insect) predatory species especially the members of the genus *Liosarcophaga* are characteristic. *Liosarcophaga aegyptica, L. jacobsoni* and *L. portschinskyi* are the three species accompanying the pontico-mediterranean grass-steppe, the first two being restricted to the extreme dry forest steppe of southern and eastern Slovakia, whereas *L. portschinskyi* is more generally distributed in all dry grassland habitats of central (but also in western and northern) Europe. The natural oak stands are accompanied by *Liosarcophaga tuberosa, L. harpax, Parasarcophaga uliginosa* and *Robineauella (Digitiventra) pseudoscoparia*. All of them endangered in central Europe and obviously withdrawing to the southeast (especially the Romanian Carpathians and Bulgaria). The foothill steppes and forest steppes of the Carpathian system (e.g. near Budapest, in southern and eastern Slovakia) are inhabited by the carpatho-edemic species of *Sarcophaga – S. moldavica, S. ukrainica* and *S. zumptiana. S. moldavica* appears to be a specially steppe bound taxon, whereas *S. zumptiana* – a typical forest species – ascends also montane elevations. *Sarcophaga ukrainica* is obviously a rare and local species confined to the eastern Carpathians. *Sarcophaga serbica* may also be present in dry and hot plain habitats of eastern Carpathians, but the ecological potence of this rare species is not yet cleared. *Heteronychia hirticrus* and *Pandelleana protuberans* seem to be the species dominating the dry formations

of this vegetation tier in entire central Europe. The next characteristic phenomenon of this formation (well observed especially in southern Slovakia, southern Moravia and eastern Austria) is the increasing density of the originally subtropical and partly synanthropic *Liopygia crassipalpis* and its stepwise distributional dilatation in the xerothermic niches. In Hungary (and in the Balkan countries), *L. crassipalpis* appears to a current synanthrope accompanying both urban and extraurban habitats.

### Vegetation tier 2 – beech-oak tier

This vegetation tier comprises thermophilic forests with ceasing xerothermofilic formations (forest-steppes) and it includes such formations as *Querceta pinea*, Fagi *Querceta*, Carpini *Acereta* and, locally, *Pineta dealpina*. It is consequently characterized by its intermediate or transitive character and it is difficult to characterize its flesh-fly taxocenoses unambiguously. It seems, however, that especially such species as *Helicophagella noverca* and *Bellieriomima subulata* show characteristic densities in these dry and warm forests. The next characteristic taxa are the parasitoids of bombycoid caterpillars, especially *Robineauella caerulescens*, a species which otherwise radiates in higher vegetation tiers, very often in the neighbouring tier 3 and, partly, 4. Of stenoecious taxa especially *Rosellea aratrix* and *Heteronychia depressifrons* should be mentioned. Such species as *Rosellea uliginosa*, *Digitiventra pseudoscoparia*, *Liosarcophaga tuberosa* and partly also *L. harpax* characteristic of these forest stands are obviously endangered and they are stepwise vanishing, either surviving very locally or gradually withdrawing to the southeast.

### Vegetation tier 3 – oak-beech tier

This tier comprises mostly Querci *Fageta* to Tiliae *Acereta* and its flesh-fly taxocenoses are rather similar to those of the previous vegetation tier. It seems, however, that such species as *Helicophagella noverca* and especially *Bellieriomima subulata* do not reach densities observed in vegetation tier 2 (or they are restricted to warm sites, e.g. on limestone), and that especially such forest species as *Helicophagella rosellei* and partly also *Pierretia nemoralis* start to appear. *Robineauella caerulescens* is a current species there together with the occasional occurrence of such species as *Liosarcophaga similis*, *Heteronychia nigricaudata* – the next forest species accompanying natural forest stands in the hilly plateaus of central Europe.

### Vegetation tier 4 – beech tier

This is the first formation showing montane or at least demontane character including *Fageta typica* with their numerous edaphic and hydric modifications (e.g. *Pineta quercina* and *Pineta abietina*, *Tili Fageta* and *Fageta dealpina*). Their flesh-fly taxocenoses are clearly dominated by *Helicophagella rosellei* accompanied by *Helicophagella agnata* and especially by *Pierretia nemoralis*. It seems that the obviously vanihing *Kramerea schuetzei* was also a characteristic species of these forest stands. *Robineauella caerulescens* belongs still to current flesh-fly taxa in these habitats and individually *Rosellea aratrix* and *Liosarcophaga similis* are observed.

### Vegetation tier 5 – fir-beech tier

This tier is characteristic of most mountain habitats of the Hercynian district of central Europe (e.g. in the entire Bohemian Massif), of the Carpathian district (the Fatra Mts. and the High Tatra Mts. below timberline) and also of the northern slopes of the Alps. Their flesh-fly taxocenoses are rather poor and in the Hercynian district missing any endemic taxa. In the Carpathians and in the Alps the situation is different. Together with *Helicophagella rosellei* and *Pierretia nemoralis* the occurrence of *Pierretia lunigera* and *P. discifera* appears to be very characteristic, especially on limestone. In the Carpathian beech stands of this tier the presence of the endemic *Sarcophaga bachmayeri* appears to be very characteristic. In central parts of the Slovakian Carpathians and in the Ukrainian Carpathians these beech stands on limestone are dominated or at least accompanied by *Heteronychia cepelaki*, a species

recently discovered also in the limestone Alps (Hochschwab, Carinthia), a very characteristic inhabitant of such formations. In the Plateau of Muráň (Central Slovakian Carpathians) the limestone cliffs approaching elevations of 1.000 m a.s.l. are populated by *Heteronychia bezziana*, a species common in the limestone formations of the southern slopes of the limestone Alps and limestone formations of the Balkan peninsula. An island population of this taxon shows a demontane occurrence [at vegetation tier 2 (3)] in central Bohemia (Bohemian Karst near Prague). In the Alps another endemic species of *Sarcophaga* accompanies similar habitats, viz. *Sarcophaga novaki*. But also the carpatho-endemic *Sarcophaga zumptiana* may ascend this tier via the warmer valleys of the lower vegetation tiers, esspecially from the vegetation tier 4 and 3. All euryoecious forest taxa of the flesh-flies (e.g. *Heteronychia vagans*) are often present in these forest stands.

**Vegetation tiers 6-7 – spruce-beech-fir tier and spruce tier**

The flesh-fly taxocenoses of these two vegetation tiers cannot be practically distinguished the differences depending more or less on the exposition of the hilltops, on the edaphic conditions etc. Generally, these taxocenoses are very poor on granites and generally on acid bedrocks, obviously due to the poverty of their hosts. But they are very well developed and comparatively rich on limestone. The flesh-fly communities of mountain Piceta in practically all Hercynian mountain ranges are represented by the impoverished forest taxocenozes characteristic of the lower vegetation tiers. They are characterized by the presence of the ubiquitous species of *Sarcophaga* (especially *S. variegata*), individually by *Helicophagella crassimargo* (characteristic of podzol soils) and by such coniferous forest taxa as *Helicophagella rosellei*, *Pierretia nemoralis*, occasionally by *Robineauella caerulescens* etc.

The situation becomes completely different in the limestone habitats. Regardless of considerable densities of ubiquitons taxa both in the Carpathians and in the Alps and especially on prominent, sunlit limestone cliffs such habitats are clearly dominated by *Helicophagella novella* (locally present also on high mountain granites), by the two species of *Pierretia*, of which *Pierretia lunigera* is usually more common than the related *P. discifera*. The next species accompanying these formations is *Pierretia soror*, a form which may rarely occurs also at lower elevations, but nearly exclusively in limestone habitats. Very rarely the presence of *Heteronychia cepelaki* was observed, and it seems that especially in the limestone ranges of the (Austrian) Alps this species ascends higher elevations than in the Carpathians (where its optimal niches exist on the forested limestone cliffs approaching 1.000 m a.s.l.) accompanying the alpine mountain Piceta. The next members of these high mountain flesh-fly taxocenoses clearly differentiate the Carpathian from the Alpine fauna. *Heteronychia vicina*, one of the species dominating these vegetation tiers in the Alps, seems to be very rare in the Carpathians. The next taxa are clearly differential: Whereas the alpine-endemic *Sarcophaga novaki* clearly dominates especially the 7th vegetation tier in the Alps, it seems that no Carpatho-endemic species of *Sarcophaga* lives in the Carpathians, because the carpatho-endemic *Sarcophaga bachmayeri* is clearly focused in the fifth vegetation tier and its presence in higher Carpathian tiers results from the thermic air currents (similarly as is the case of the carpatho-endemic *S. zumptiana* accompanying the warm oak stands of lower tiers). The next taxon not yet observed in the Carpathians is *Heteronychia taurica* described from the peninsula of Krim and observed in the hilltop of Hetzkogel above Lunz (Lunzer Alpen) at 1.700 m a.s.l. *Heteronychia taurica* lives also in Greece (foothills of Olympos).

**Vegetation tiers 8 (9) – dwarf mountainous pine-tier**

Essentially the zone of *Pinus mugho* (with *Pinus cembra*, *Larix* and *Sorbus* and/or *Alnus viridis*) and the adjacent zone close to the timberline is involved. This vegetation tier shows no specific taxa, but is easily defined by the common, frequently mass occurrence of such species as *Helicophagella novella*, *Sarcophaga novaki* (absent from the Carpathians) and *Heteronychia vicina* (very rare in the Carpathians), and by the regular occurrence of *Pierretia soror* and the extrazonal presence of *Discachaeta pumila*. In the southern Alps and/or in the sunlite southern alpine slopes the timberline zone is characterized by the presence of *Heteronychia porrecta*, *H. rohdendorfi* and *H. ancilla*. Generally such taxa as *Pierretis lunigera*, *P. discifera* and other species accompanying usually lower vegetation tiers may be occasionally present, especially on hot and sunny summer days.

## Extrazonal flesh-fly taxocenoses of central Europe

The above composition of the central European flesh-fly taxocenoses relates to the zonal character of the vegetation tiers. There exist, however, rather remarkable flesh-fly-taxocenoses showing no zonal character, but reflecting rather specific local and extrazonal environmental conditions and constellations. At least three examples of such extrazonal taxocenoses should be mentioned. Most of them are confined to the limestone formations, since the limestone habitats offer the most favourable conditions for the species diversity of the flesh-flies due to the variety of sarcophagine hosts.

The first group of extrazonal taxocenoses is represented by limestone hills and rocks arising e.g. from the Great Hungarian Plain. Such formations are found near or in Budapest, in southern Slovakia (Modrý kameň – Hegyfárok) on the Danube near Štûrovo and near Nitra, and, finally the most northern habitat of the Pavlovské vrchy Hills in southern Moravia, all of them having the character of limestone islands. These formations hide rather thermophilic taxa of mediterranean origin reaching their (extrazonal) limits in the above localities. Their presence there results probably from immigration of the steppe fauna during the so-called Atlantic Warm Period (6th-4th thousand years B.C.), before the entire territory was repeatedly forested this forest period lasting up to the medieval centuries during which it has been losened by the human activities.

These taxa are:

1. *Heteronychia setinervis*, a species common in the limestone habitats of Greece and Asia Minor but increasingly rare in Bulgaria and extremely rare in Hungary (not reaching Slovakia).

2. *Heteronychia mutila*, a comparatively common taxon in the limestone habitats of the Balkan peninsula (e.g. in Pobiti Kamni near Varna, Bulgaria).

3. *Discachaeta cucullans*, a generally rare, extremely thermophilic eastern-mediterranean species confined to the limestone habitats. Its northern most habitat are limestone cliffs of the Pavlovské vrchy Hills in southern Moravia.

It seems that the extremely rare mediterranean taxon *Ctenodasypygia minima* might possibly also belong to such extrazonal taxa in central Europe.

A partly discontinuous distribution pattern show also some other (east)mediterranean taxa populating the xerothermic habitats of the Balkan peninsula including Hungary and reaching south of Slovakia: *Liosarcophaga aegyptica* and *L. jacobsoni*.

The next extrazonal flesh-fly taxocenosis exists in the so-called Prague Basin (or Interior Bohemia), namely in the limestone territory of the Bohemian Karst. The extrazonality of this habitat is characterized by the mingling of the comparatively xerothermophilous species such as *Heteronychia filia* and *Discachaeta arcipes*, the first of which being of mediterranean origin, with the demontane occurrence of *Heteronychia vicina* (a species dominating the limestone formations of the Alps near the timberline and very rare in the high Carpathians), and *Heteronychia bezziana*, an essentially mountain species accompanying limestone formations of the Balkan peninsula and of the Alps. Its nearest habitats are found in the Slovakian Carpathians (Považsky Inovec Hills, Muráň Plateau Hills). In rare instances individual specimens of *H. bezziana* occur at low elevations during the autumn. The next extrazonal flesh-fly association lives in the beech stands on limestone in the Moravian Karst north to Brno. These stands corresponding to 3rd vegetation tier are populated by a curious flesh-fly taxocenosis comprising both comparatively thermophilous taxa *(Helicophagella noverca, Bellieriomima subulata)* together with the couple of species *Pierretia lunigera-Pierretia discifera* typical of high mountain beech stands (starting with 5th vegetation tier) of the limestone Alps and Carpathians). It is obvious, also due to the unique but rare presence of *Sarcophaga zumptiana* in this territory, that these beech stands were essentially influenced by the endemic and subendemic faunal element of the Carpathians. The occurrence of both *Pierretia lunigera* and *P. discifera* at such low elevations (about 490 m a.s.l. compared with 900-1.800 m a.s.l. in the Alps and the Carpathians) is clearly demontane.

The very characteristic formation of peat bogs in Bohemia and the peat bogs generally show no chorologically specific taxocenosis of flesh-flies. Curiously enough at least *Sarcophaga carnaria* may be observed on their margins. It seems that extremely hydrophylic species, such as *Discachaeta pumila* and especially *Pierretia villneuvei* may accompany humid acid meadows.

The endemism of forested eastern Carpathians [approximately vegetation tier 3(-4)] is also characterized by the presence of the rare *Heteronychia slovaca* populating both the Slovakian and the Ukrainian part of the Carpathian range.

There exist, however, also two species the occurrence of which in the central European habitats is probably extrazonal. The first is *Heteronychia rohdendorfi* originally described from the Slovak Carpahians and showing a scattered distributional pattern in the loess- and limestone habitats in Hungary, Moravia and Bohemia. It shows that it is common near the timberline zone of the limestone formations of the Olympos Mts. (Kataphygion II) in Greece and in the limestone Alps of Switzerland so that obviously a mountain taxon is concerned. The next species of a similar distribution is *Heteronychia porrecta*, originally described from the northern Italian Alps (Alto Adige) and later discovered also in the Slovakian limestone Fatra Mts. Quite recently the species was found to dominate the high-mountain forests of the Pindos Mts. in Greek Macedonia and the timberline zone of the Olympos Mts. in Greece. Also the rare early spring species *Heteronychia ancilla* of Central Europe is common rather in the limestone mountains of Greece representing possibly its preferred habitat.

## Forensic importance

The succession of animals, especially of insects and primarily of dipterans, on unburied corpses is a part of natural changes following death.

Flesh-flies usually belong to the so-called second wave (of five generally recognized – see e.g. Smith 1986) of vertebrate carcase decomposers, the first wave comprising mostly calliphorid (blowflies) and partly muscoid species (especially *Calliphora, Lucilia, Cynomya, Musca* and *Muscina*), whereas the second one is less distinctive. It should be emphasized, however, that the interpretation of these "waves" is somewhat controversial, and our own observation (the first author) shows strong indications that the flesh-fly activity is generally a part of the "fly wave" or "fly succession phase" representing actually the first and very important destruction stage responsible for the essential decomposition of the carcase. The phases (waves) of the insect succession appear to be, however, unimportant for a forensic pathologist to decide what decomposition (decay) phase a dead body has reached. The usual central European sequence is *Lucilia sericata* (Meigen, 1826) or *L. caesar* (Linnaeus, 1758) and/or *Calliphora vicina* Robineau-Desvoidy, 1830 and/or *C. vomitoria* (Linnaeus, 1758), possibly also *Cynomya mortuorum* (Linnaeus, 1761), gradually followed by the flesh-flies (possibly rather different taxa almost exclusively of the tribe Sarcophagini are involved). Unlike the calliphorine bluebottles and blowflies, the flesh-flies do not seem to be primarily carcase consumers and at least their third instar larvae (maggots) very often show predatory trends. That is why the flesh-fly taxa are not frequently reared from carrion colonized by larvae of the above most important fly families, or only individual specimens emerge. Moreover, the flesh-fly species visiting carcase mostly belong to the synanthropic element of subtropical or even tropical origin, although several other species (e.g. of the genera *Helicophagella, Pierretia* and especially *Parasarcophaga* and *Liosarcophaga*) are also occasionally attracted by carrion. The synanthropic flesh-fly taxa are also attracted by, and occasionally reared from dead (human) corpses found in human habitations including flats.

Similarly as in the case of blowflies, only a limited number of flesh-flies are involved in forensic cases and mentioned in the corresponding literature: *Bercaea cruentata* (Meigen, 1826) (syn. *haemorrhoidalis* Fallén, 1817), *Parasarcophaga hirtipes* (Wiedemann, 1830), *Liosarcophaga dux* (Thomson, 1869) (usually misinterpreted as "*misera*" auctt. not Walker, 1849 or *L. exuberans* Pandellé, 1896 – a synonym of *L. dux* Thoms.) and closely related species (e.g. *Liosarcophaga tibialis* (Macquart, 1850), *L. jacobsoni* Rohdendorf, 1937, *Liopygia crassipalpis* (Macquart, 1839) and *L. argyrostoma* (Robineau-Desvoidy, 1830)).

As for *Bercaea cruentata*, this species is primarily a faeces breeder attracted chiefly to fresh stools mainly in tropical and subtropical zone. It also occurs on stools disseminated in nature of central Europe, mostly in high and late summer. Its forensic importance is controversial, since obvious misidentifications have been due to its name ("red-tailed flesh-fly"), relating to the reddish genital segments which are also characteristic of the two above synanthropic species of *Liopygia* and also of numerous species of the genus *Liosarcophaga*. It seems generally that misidentification of taxa of the flesh-fly tribe Sarcophagini is responsible for the considerable confusion in the pertaining literature.

Another possibility is that the larvae of *B. cruentata* might be involved in forensic cases when the intestine content of unburied corpses has been made accessible to the larvipositing females of this species. *Parasarcophaga hirtipes* (and *Parasarcophaga albiceps* (Meigen, 1826)) is the next primarily coprophagous species suspected to be of forensic importance, although no exact information on its forensic involvement is available. However, its importance in hygiene and possibly also in epidemiology is indubitable.

The next three taxa, viz., *Liopygia crassipalpis, L. argyrostoma* and *Liosarcophaga dux*, are clearly necrophagous and numerous data are available on their successful rearing from dead corpses of vertebrates, but also from snails, meat etc., including forensic cases. *Liosarcophaga dux* is widely distributed in the Afrotropical, Oriental and Australian Regions, but it also occurs in the (eastern) Mediterranean, reaching Europe especially in the coastal regions of Bulgaria, Greece, Dalmatia etc., where it develops especially on sea shores in corpses of dead sea animals including fish, crustaceans, etc. It has been frequently reared from vertebrate carcases, including laboratory rearings. The species is obviously rather thermophilic and is absent from central Europe. Both *Liopygia crassipalpis* and especially *L. argyrostoma* are species not only trophically confined to decaying meat (and carrion), but also involved in forensic cases, although little exact or limited information is still available. Since the first author reared these two species in laboratory and experienced their forensic importance, at least two actual forensic cases are worth mentioning. In August 1992 a murdered wife was found in her flat in Brno (central Moravia). The forensic entomology conclusion stated a rather progressive fly succession, comprising mainly masses of larvae belonging mostly to *Lucilia sericata*, including a few freshly hatched adult flies. During subsequent laboratory rearing of maggot samples also several specimens of *Liopygia crassipalpis* emerged, strongly indicating a late fly succession phase, including possible predation on maggots of *Lucilia sericata*. Due to high ambient temperatures exceeding 30 °C for nearly 10 days long, the total development from larviposition to emerged adults amounted to less than 10 days, probably only one week. This conclusion, together with some other indications, contributed essentially to the conviction a suspected person of murder. In a second case numerous maggots of *Liopygia argyrostoma* were reared in laboratory from the decaying body of a wife found dead in her bed in a closed heated room before the end of April 1993. These third instar larvae, partly before pupation, were collected together with a mass of larvae of *Calliphora vomitoria*. Since the majority of emerging or emerged flies belonged to (first generation) *Calliphora vomitoria* (and a few specimens of *Lucilia sericata*), but no puparia and no adults of *L. argyrostoma* were detected on the corpse and in the room, it was concluded that, at the existing room temperatures averaging 25° C, the complete development from larviposition to the emergence of first adults (reared from larvae in laboratory) took about 20-22 days. This age of the dead body was later confirmed by the criminal police. It seems that in this case, too, mature maggots of *L. agryrostoma* might have been involved in the predation on the maggots of *Calliphora vomitoria*, the primary feeder on the body.

The data on "*Sarcophaga carnaria*" in connection with mostly unverified or poorly verified forensic cases (Smith 1986) are obviously taxonomically confused. The species of the genus *Sarcophaga* are known to be parasitoids of earthworms or they have been occasionally and exceptionally reared from decaying meat (e.g. from dead rats). But long-term experience indicates that the generic name "*Sarcophaga*" has currently been used to denote specifically unidentified taxa of the whole tribe Sarcophagini. It shows that a correct identification of such taxa should be based on examination of (♂) genitalia by a specialist.

| No. | Species | Country | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hungary | Austria | Czechia | Slovakia | Poland | Germany |
| 1. | *Macronychia lemariei* Jac. | + | – | + | + | – | – |
| 2. | *M. striginervis* (Ztt.) | + | + | + | + | + | + |
| 3. | *M. agrestis* (Fll.) | + | + | + | + | + | + |
| 4. | *M. griseola* (Fll.) | + | + | + | + | + | + |
| 5. | *M. polyodon* (Mg.) | + | + | + | + | + | + |
| 6. | *M. alpestris* Rd. | + | + | + | + | + | + |
| 7. | *Senotainia conica* (Fll.) | + | + | + | + | + | + |
| 8. | *S. tricuspis* (Mg.) | + | + | + | + | + | + |
| 9. | *S. albifrons* (Rd.) | + | + | + | + | + | + |
| 10. | *S. puncticornis* (Ztt.) | + | + | + | + | + | + |
| 11. | *Protomiltogramma fasciata* (Mg.) | + | + | + | + | + | + |
| 12. | *Pterella convergens* (Pand.) | – | – | – | – | + | + |
| 13. | *P. grisea* (Mg.) | + | + | + | + | + | + |
| 14. | *P. melanura* (Mg.) | + | + | + | + | + | + |
| 15. | *P. penicillaris* (Rd.) | + | – | + | – | – | – |
| 16. | *Anacanthothecum testaceifrons* (Vill.) | + | + | + | + | + | + |
| 17. | *Miltogramma brevipilum* Vill. | – | + | + | + | – | – |
| 18. | *M. germari* Mg. | + | + | + | + | + | + |
| 19. | *M. murinum* Mg. | + | + | + | + | + | + |
| 20. | *M. oestraceum* (Fll.) | + | + | + | + | + | + |
| 21. | *M. punctatum* Mg. | + | + | + | + | + | + |
| 22. | *M. villeneuvei* Verves | + | + | + | + | + | + |
| 23. | *Miltogrammidium rutilans* (Mg.) | + | + | + | + | + | + |
| 24. | *M. taeniatum* (Mg.) | + | + | + | + | + | + |
| 25. | *Apodacra pulchra* Egger | + | + | + | + | + | + |
| 26. | *Amobia oculata* (Ztt.) | + | + | + | + | + | + |
| 27. | *A. pelopei* (Rd.) | + | + | – | – | – | + |
| 28. | *A. signata* (Mg.) | + | + | + | + | + | + |
| 29. | *Metopodia grisea* B.B. | + | + | + | – | – | + |
| 30. | *Phylloteles pictipennis* Lw. | + | + | + | + | + | + |
| 31. | *Oebalia cylindrica* (Fll.) | + | + | + | – | + | + |
| 32. | *O. sachtlebeni* Rohd. | – | – | – | – | + | + |
| 33. | *O. unistriata* Rohd. | + | – | – | – | + | – |
| 34. | *Ptychoneura minuta* (Fll.) | + | + | + | + | + | + |
| 35. | *Hilarella hilarella* (Ztt.) | + | + | + | + | + | + |
| 36. | *H. stictica* (Mg.) | + | + | + | + | + | + |
| 37. | *Paragusia elegantula* (Ztt.) | + | + | – | – | + | + |
| 38. | *Taxigramma heteroneura* (Mg.) | + | + | + | + | + | + |
| 39. | *Metopia argyrocephala* (Mg.) | + | + | + | + | + | + |
| 40. | *M. campestris* (Fll.) | + | + | + | + | + | + |
| 41. | *M. grandii* Vent. | + | – | – | – | – | – |
| 42. | *M. italiana* Pape | – | + | – | – | + | – |

| No. | Species | Country | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hungary | Austria | Czechia | Slovakia | Poland | Germany |
| 43. | *M. roseri* Rd. | + | + | + | + | + | + |
| 44. | *M. staegeri* Rd. | + | + | + | – | + | + |
| 45. | *M. tshernovae* Rohd. | – | – | – | – | + | – |
| 46. | *Mesomelaena mesomelaena* Rd. | + | + | + | + | – | + |
| 47. | *Phrosinella nasuta* (Mg.) | + | + | + | + | + | + |
| 48. | *Sphenometopa fastuosa* (Mg.) | – | + | + | + | + | + |
| 49. | *Eurychaeta muscaria* (Mg.) | + | + | + | + | + | + |
| 50. | *E. palpalis* (R.-D.) | + | + | + | + | + | + |
| 51. | *Agria mamillata* (Pand.) | + | + | + | + | + | + |
| 52. | *A. monachae* (Kr.) | – | – | + | + | + | + |
| 53. | *A. punctata* R.-D. | + | + | + | + | + | + |
| 54. | *Angiometopa falleni* Pape | + | + | + | + | + | + |
| 55. | *Brachicoma devia* (Fll.) | + | + | + | + | + | + |
| 56. | *Nyctia halterata* (Pz.) | + | + | + | + | + | + |
| 57. | *Paramacronychia flavipalpis* (Girsch.) | + | + | + | + | + | + |
| 58. | *Sarcophila latifrons* (Fll.) | + | + | + | + | + | + |
| 59. | *Wohlfahritia magnifica* (Schin.) | + | – | – | + | – | – |
| 60. | *W. meigeni* (Schin.) | + | + | + | + | + | + |
| 61. | *Blaesoxipha cochlearis* (Pand.) | + | + | + | + | + | + |
| 62. | *B. grylloctona* Lw. | – | – | – | – | + | + |
| 63. | *B. occatrix* (Pand.) | + | – | + | + | – | – |
| 64. | *B. plumicornis* (Ztt.) | + | + | + | + | + | + |
| 65. | *B. pygmaea* (Ztt.) | – | – | – | – | + | + |
| 66. | *B. redempta* (Pand.) | + | + | + | + | + | + |
| 67. | *B. ungulata* (Pand.) | + | – | – | – | + | – |
| 68. | *Servaisia erythrura* (Mg.) | + | + | + | + | + | + |
| 69. | *S. rossica* (Vill.) | + | + | + | + | + | + |
| 70. | *Tephromyia grisea* (Mg.) | + | + | + | + | + | + |
| 71. | *Ravinia pernix* (Harris) | + | + | + | + | + | + |
| 72. | *Sarcotachinella sinuata* (Mg.) | + | + | + | + | + | + |
| 73. | *Helicophagella agnata* (Rd.) | + | + | – | + | + | + |
| 74. | *H. novella* (Bar.) | – | + | + | + | + | + |
| 75. | *H. crassimargo* (Pand.) | + | + | + | + | + | + |
| 76. | *H. noverca* (Rd.) | + | + | + | + | + | + |
| 77. | *H. rosellei* (Bött.) | + | + | + | + | + | + |
| 78. | *H. inopinata* | + | – | – | – | – | – |
| 79. | *H. macrura* | + | – | – | + | – | – |
| 80. | *H. melanura* (Mg.) | + | + | + | + | + | + |
| 81. | *Discachaeta amita* (Rd.) | + | – | – | – | + | + |
| 82. | *D. arcipes* (Pand.) | + | + | + | + | + | + |
| 83. | *D. cucullans* (Pand.) | + | – | – | + | – | + |
| 84. | *D. pumila* (Mg.) | + | + | + | + | + | + |
| 85. | *Heteronychia mutila* (Vill.) | + | – | – | + | – | – |
| 86. | *H. ancilla* (Rd.) | + | + | + | + | – | – |

| No. | Species | Country | | | | | |
|---|---|---|---|---|---|---|---|
| | | Hungary | Austria | Czechia | Slovakia | Poland | Germany |
| 87. | *H. benaci* (Bött.) | – | + | + | + | + | + |
| 88. | *H. boettcheriana* (Rohd.) | + | + | + | + | + | + |
| 89. | *H. cepelaki* Pov. & Slam. | – | + | + | + | – | – |
| 90. | *H. depressifrons* (Ztt.) | + | + | + | + | + | + |
| 91. | *H. dissimilis* (Mg.) | + | + | + | + | + | + |
| 92. | *H. haemorrhoa* (Mg.) | + | + | + | + | + | + |
| 93. | *H. haemorrhoides* (Bött.) | + | + | + | + | + | + |
| 94. | *H. hirticrus* (Pand.) | + | + | + | + | + | + |
| 95. | *H. infixa* (Bött.) | + | + | + | – | – | + |
| 96. | *H. lednicensis* Pov. | – | – | + | – | – | – |
| 97. | *H. pauciseta* (Pand.) | – | – | – | + | + | + |
| 98. | *H. porrecta* (Bött.) | – | + | – | + | – | – |
| 99. | *H. proxima* (Rd.) | + | + | + | + | + | + |
| 100. | *H. rohdendorfi* (Pov. & Slam.) | + | – | + | + | + | – |
| 101. | *H. rohdendorfiana* Mih. | + | + | + | + | + | + |
| 102. | *H. rondaniana* (Rohd.) | + | + | – | + | + | + |
| 103. | *H. schineri* (Bezzi) | + | + | + | + | + | + |
| 104. | *H. slovaca* Pov. & Slam. | – | – | – | + | – | – |
| 105. | *H. thalhammeri* (Bött.) | + | – | – | – | – | – |
| 106. | *H. vagans* (Mg.) | + | + | + | + | + | + |
| 107. | *H. vicina* (Mcq.) | – | + | + | + | + | + |
| 108. | *H. filia* (Rd.) | + | + | + | + | + | + |
| 109. | *H. minima* (Rd.) | + | – | + | – | – | – |
| 110. | *H. taurica* (Rohd.) | – | + | – | – | – | – |
| 111. | *Arachnidomyia sexpunctata* (F.) | + | + | + | + | + | + |
| 112. | *Ascelotella granulata* (Kr.) | + | + | + | + | + | + |
| 113. | *Bellieriomima subulata* (Pand.) | + | + | + | + | + | + |
| 114. | *Krameromyia anaces* (Wlk.) | + | + | + | + | + | + |
| 115. | *Pandelleana protuberans* (Pand.) | + | + | + | + | + | + |
| 116. | *Pierretia nemoralis* (Ke.) | + | + | + | + | + | + |
| 117. | *P. discifera* (Pand.) | – | + | + | + | + | + |
| 118. | *P. lunigera* (Bött.) | – | + | + | + | + | + |
| 119. | *P. nigriventris* (Mg.) | + | + | + | + | + | + |
| 120. | *P. socrus* (Rd.) | + | + | + | + | + | + |
| 121. | *P. soror* (Rd.) | + | + | + | + | + | + |
| 122. | *P. villeneuvei* (Bött.) | + | + | + | + | + | + |
| 123. | *Thyrsocnema incisilobata* (Pand.) | + | + | + | + | + | + |
| 124. | *T. kentejana* Rohd. | – | + | – | + | – | – |
| 125. | *Pseudothyrsocnema spinosa* (Villn.) | + | – | – | – | – | – |
| 126. | *Bercaea cruentata* (Mg.) | + | + | + | + | + | + |
| 127. | *Liosarcophaga tibialis* (Mcq.) | + | – | – | – | – | – |
| 128. | *L. aegyptica* (Salem) | + | – | – | + | – | – |
| 129. | *L. emdeni* (Rohd.) | + | + | + | + | + | + |
| 130. | *L. harpax* (Pand.) | + | + | + | + | + | + |
| 131. | *L. jacobsoni* (Rohd.) | + | – | – | + | – | + |
| 132. | *L. pleskei* (Rohd.) | – | + | – | – | – | – |
| 133. | *L. portshinskyi* (Rohd.) | + | + | + | + | + | + |

| No. Species | Country | | | | | |
|---|---|---|---|---|---|---|
| | Hungary | Austria | Czechia | Slovakia | Poland | Germany |
| 134. *L. teretirostris* (Pand.) | – | + | – | – | – | + |
| 135. *L. tuberosa* (Pand.) | + | + | + | + | + | + |
| 136. *L. similis* (Meade) | + | + | + | + | + | + |
| 137. *Liopygia crassipalpis* (Mcq) | + | + | + | + | – | + |
| 138. *L. argyrostoma* (R.-D.) | + | + | + | + | + | + |
| 139. *L. uliginosa* (Kr.) | + | + | + | + | + | + |
| 140. *Parasarcophaga albiceps* (Mg.) | + | + | + | + | + | + |
| 141. *Robineauella pseudoscoparia* (Kr.) | – | – | + | + | + | + |
| 142. *R. caerulescens* (Ztt.) | + | + | + | + | + | + |
| 143. *Stackelbergeola mahadiensis* (Bött.) | – | – | + | – | – | – |
| 144. *Kramerea schuetzei* (Kr.) | + | + | + | + | + | + |
| 145. *Rosellea aratrix* (Pand.) | + | + | + | + | + | + |
| 146. *Sarcophaga bachmayeri* Lehrer | + | + | – | + | – | – |
| 147. *S. carnaria* (L.) | + | + | + | + | + | + |
| 148. *S. lasiostyla* Mcq. | + | + | + | + | + | + |
| 149. *S. moldavica* Rohd. | + | – | – | + | + | – |
| 150. *S. moravica* Pov. | – | – | + | – | – | – |
| 151. *S. novaki* Bar. | – | + | – | – | – | – |
| 152. *S. serbica* Bar. | + | – | – | + | – | – |
| 153. *S. subvicina* Rohd. | + | + | + | + | + | + |
| 154. *S. ukrainica* Rohd. | + | – | – | + | – | – |
| 155. *S. variegata* (Scopoli) | + | + | + | + | + | + |
| 156. *S. zumptiana* Lehrer | + | + | + | + | – | – |

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### Key to the subfamilies of Sarcophagidae

1. Hind coxae with fine hairs on posterior surface. ♂ abdominal segment VII+VIII lacking discal bristles, complete, surstylus of ♂ genitalia short. Hypophallus differentiated into numerous sclerites ("internal parts of distiphallus" – styli, medial process, capitis etc.). ♀ abdominal tergites VII-X ("ovipositor") more or less strongly reduced ........ Sarcophaginae
– Hind coxae bare on posterior surface. ♂ segment VII+VIII with discal bristles or separated, surstylus often elongate; acrophallus or complete hypophallus present. ♀ with tergites VII-X (of ovipositor) well developed, sometimes partly reduced ........ 2.
2. Posterior spiracle non-operculate, with hairs along circular rim very short ventrally and in form of long bristles anteriorly and posteriorly. Dorsolateral and medial processes of paraphallus absent. ♀ with tergite X (of ovipositor) absent, tergite VIII developed in form of a black, pointed ovipositor (species of subgenus *Macronychia* s. str.) ........ Macronychiinae
– Posterior spiracle operculate with one (Paramacronychiinae) or two (Miltogrammatinae) lappets ........ 3.
3. ♂ with tergite VI well developed, with bristles or bare, complex segment VII+VIII without discal bristles (setae). ♀ tergites VII and VIII (ovipositor) well developed, with broad intersegmental membranes and forming short telescopic ovipositor ........ Miltogrammatinae
– ♂ tergite VI absent, if present (in *Eurychaeta*) then segment VII+VIII with a row of discals. ♀ with tergites VII and VIII partly reduced or separate along midline, intersegmental membranes narrow, telescopic ovipositor not developed ........ Paramacronychiinae

### Subfamily Macronychiinae

Brauer & Bergenstamm, 1889: Denkschr. Akad. Wiss. Wien 56: 76

Grey, medium to large-sized flies. Sexual dimorphism slight. Parafacials and genae very broad, setulose. Head laterally shorter at level of vibrissae than at lunula. Propleuron bare. 3rd antennal segment not more than twice length of 2nd. Vibrissae well developed and situated high above lower head margin. Claws and pulvilli of both sexes strong and elongate. Wings hyaline, cell $R_5$ open, $r_1$ bare. Epiphallus present, acrophallus elongate or short. Abdomen grey pollinose with 3 triangular black spots on each abdominal tergite, these spots reduced in some species. The single genus *Macronychia* comprising 14 species is distributed in Holartic, Neotropic and Oriental (Taiwan) regions. Larvae are inquilines in nests of Sphecoidea, occasionally in nests of *Bombus*. The information on Neotropic species of *Macronychia* bred from adult Tabanids (Thompson 1978) is not confirmed.

### Genus *Macronychia* Rondani, 1859

Dipt. Ital. Prodromus, 3: 229.
**Type species:** *Macronychia agrestis* Rondani, 1859 (nec Fallén; 1820). (*Xysta striginervis* Zetterstedt, 1838.)

**References:** Verves 1982: Fliegen palaearkt. Reg. 11 (64 h): 235-248; Pape 1987: Fauna ent. scand. 19: 78-84.

### Key to subgenera and species of *Macronychia*

1. ♂: Pregonites S-shaped (Fig. 1), epiphallus short; apical part of cercus broad, converging towards apex (Fig. 2).
   ♀: Ovipositor elongate, black, spine-like (Fig. 3) (subgenus *Macronychia* s. str.) ........ 2.
– ♂: Pregonite hook-formed, apical part of cercus divergent, narrow, epiphallus elongate (Fig. 4).
   ♀: Ovipositor inconspicuous, retractile (Fig. 5) (subgenus *Moschusa* R.-D.) ........ 3.

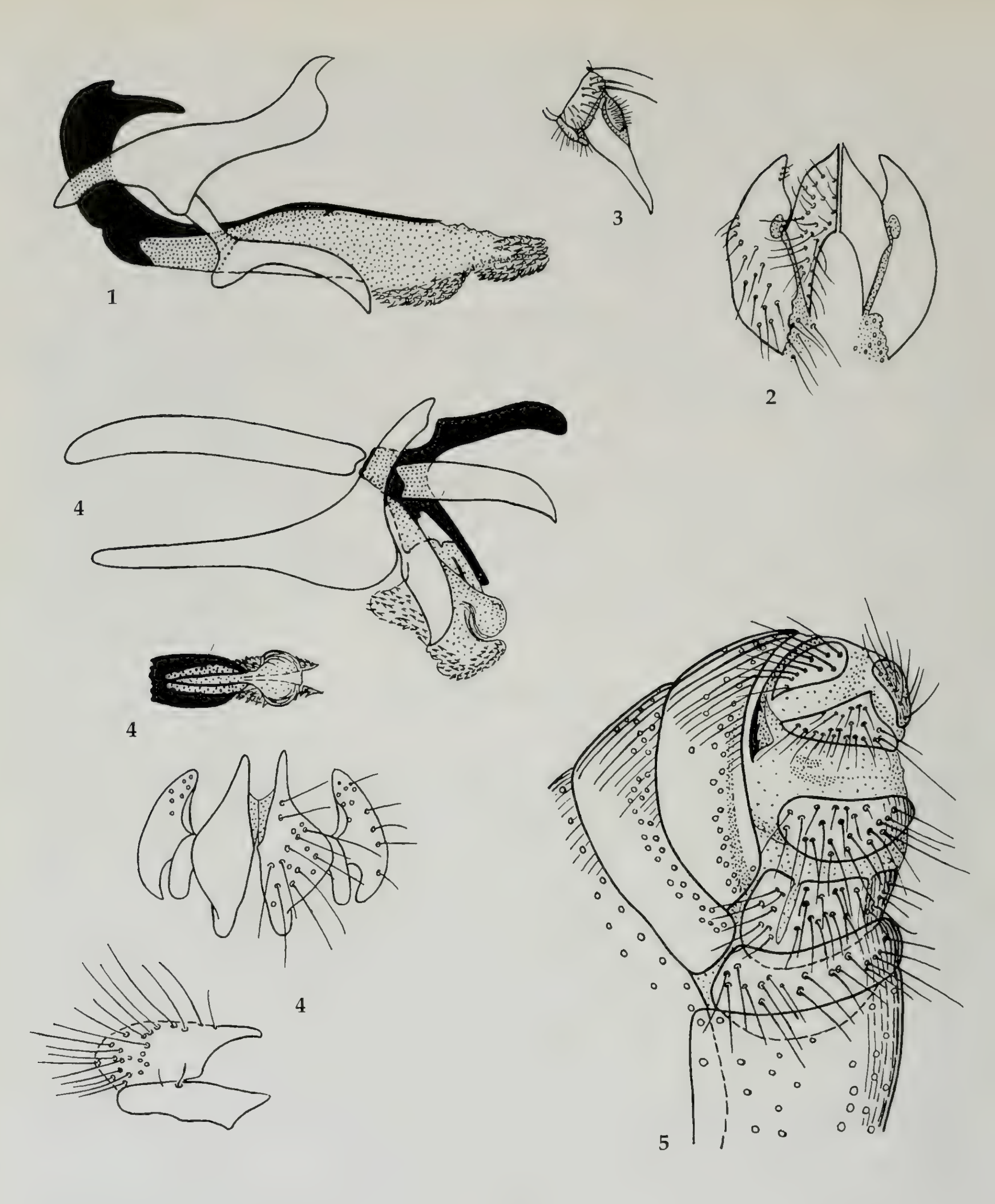



**Fig. 1.** *Macronychia striginervis.* Aedeagus and gonite, laterally.
**Fig. 2.** *Macronychia lemariei.* Cerci and surstyli, dorsally.
**Fig. 3.** *Macronychia striginervis.* Ovipositor, laterally.
**Fig. 4.** *Macronychia griseola.* Aedeagus and gonites, laterally, and distiphallus, dorsally (above and middle); cerci and surstyli dorsally and laterally (middle and bottom).
**Fig. 5.** *Macronychia griseola.* Ovipositor, lateroventrally.

2. Basicosta yellow, abdominal tergites I+II without medial marginals ........... *M.* (s. str.) *lemariei* Jac.
– Basicosta brown to black abdominal tergites I+II with medial marginals ......................................... ............................................................................................................... *M.* (s. str.) *striginervis* (Zett.)
3. Basicosta yellow, abdominal tergites I+II without medial marginals. Abdomen entirely grey with narrow median dark stripe ........................................................................ *M.* (*M.*) *griseola* (Fall.)
– Basicosta brown to black, all abdominal tergites with three elongate black spots ........................ 4.
4. Parafacial plate very broad, 0.37-0.44 eye-height and with 4-6 irregular rows of setae .................... ..................................................................................................................*M.* (*M.*) *alpestris* Rond.
– Parafacial plate narrower, 0.22-0.37 eye-height and with 1-3 irregular rows of setae .................... 5.
5. Abdominal tergites I+II with medial marginals ............................................... *M.* (*M.*) *agrestis* (Fall.)
– Abdominal tergites I+II without medial marginals ........................................ *M.* (*M.*) *polyodon* (Mg.)

## Subgenus *Macronychia* s. str.

### *Macronychia* (s. str.) *lemariei* Jacentkovsky, 1941

Práce Mor. Přír. Spol. 13: 4, 9. (Type locality: Lednice).

*vervesi* Mihályi, 1979: Acta zool. hung. 25: 160 *(Macronychia).*

#### Description

♂. Eyes separated at level of posterior ocelli by a distance equalling 0.29-0.35 of head width; frontal stripe brownish black, 1.2-2.4 times broader than parafrontal, parallel; parafrontals silvery white pollinose with numerous fine black hairs, with 7-13 fr and 1+2-3 strong or. Parafacials silvery white dusted, genal groove dark reddish. Parafacials at level of antennal base about 0.28-0.33 eye-height; with 2-3 irregular rows of setae. Ocellar bristles strong and erect; occiput with single row of postorbital setae. Genae grey, with numerous black setae, about 0.27-0.30 of eye-height. Antennae black, 1st and 2nd segments reddish, 3rd about 1.1-1.3 times as long as 2nd; arista micropubescent, proximal half inflated, vibrissal angles widely separated, distance between them equals distance from vibrissa to mouth margin. Palpi yellow.

ac 2-3+1-2, dc 2-3+3-4, ia 0+2-3, h 3-5, ph 1-2, spl 1+1. Scutellum with 3 pairs of marginal bristles and 2-3 pairs of hair-like discals. Legs black, grey dusted, $t_2$ with 2-3 ad. Mesonotum grey dusted, with 3 longitudinal dark stripes, medial stripe subdivided into three narrow ones before the transverse suture. Scutellum grey pollinose, at base black. Wings hyaline, basicosta and epaulet yellow. Costal spine absent, $R_5$ open, ratio of costal 3rd and 5th sections 1 : 1.4, m-cu S-formed.

Abdomen black, brownish grey dusted, tergites (from apparent I-V) each with 3 brownish black, elongate, not distinctly limited spots. Genitalia of ♂ grey dusted; ovipositor of ♀ lustrous black. Tergites I+II without medial marginals, tergite III with erect mediomarginals, tergites IV and V with strong rows of marginal bristles. Body length 4-8 mm.

**Distribution:** Moravia, Slovakia, Hungary, Greece, Turkey (including Asiatic part), Israel, Uzbekistan. Ecology unknown.

### *Macronychia* (s. str.) *striginervis* (Zetterstedt, 1838)

Ins. Lapp.: 633 *(Xysta).*

*Miltogramma ungulata* (Pandellé 1859): Revue Ent. 14: 101.

#### Description

♂. Eyes separated at level of posterior ocelli by a distance equal to 0.26-0.33 of head width; frontal stripe brownish black, parallel-sided, 1.2-2.5 times broader than parafrons. Parafrontal silvery white dusted, genal groove brownish black. Parafacial at level of antennal base about 0.26-0.32 eye-height, with 2-3 vertical irregular rows of setae. Ocellar bristles strong and erect; occiput with single row of

postorbital setae. Genae silvery white dusted, with numerous black bristle-like hairs, about 0.26-0.36 eye-height. Antenna and palpus black, 3rd antennal segment about 1.3-2.0 times as long as 2nd; arista microscopically pubescent, inflated in proximal ⅓-½; distance between vibrissal angles equals or shorter than distance from vibrissa to mouth margin.

Thorax grey pollinose, mesonotum with 3 dark longitudinal stripes, pleurae light grey pollinose. ac 2-3+3-4, dc 3-5+3, ia 0-1+2-3, h 3-6, ph 2-3, spl 1+1. Scutellum grey, with 3 pairs of marginals and 2-4 pairs of fine discals. Wings hyaline, often fumose along m-cu and the curved part of m. Basicosta and epaulet brown to black. Costal spine absent. $R_5$ open, ratio of 3rd and 5th costal sections 1 : 1.0-1.2, m-cu sigmoid.

Abdomen grey pollinose, with three elongate black spots on each of tergites I+II-V, spots on tergite V often reduced. Genitalia of ♂ black, grey dusted, ovipositor lustrous black. Tergites I+II and III with 1-2 pairs of medial marginals, tergites IV and V with row of marginals.

Body length 6.5-13.0 mm.

**Distribution:** Widespread in the Palaearctic region. Larvae are inquilines in nests of sphecids *(Extemnius cavifrons* Thoms.) Flies often on various flowers, preferring outskirts of forests, usually hygrophilous.

### Subgenus *Moschusa* Robineau-Desvoidy, 1863

Hist. nat. Dipt. Paris 2: 139.
**Type species:** *Tachina polyodon* Meigen, 1824.

### *Macronychia (Moschusa) agrestis* (Fallén, 1810)

Kon. svenska Vetensk. Akad. Handl. 31: 270 *(Tachina).*

#### Description

♂ Eyes separated at posterior ocelli by a distance equal to 0.23-0.33 of head width; frontal stripe brownish black, parallelsided, 1.2-1.7 times wider than parafrontal. fr 7-14, or 1+2. Parafrontal densely haired, silvery white pollinose. Parafacial silvery white dusted with 1-3 irregular vertical rows of black setae, at antennal base about 0.26-0.32 eye-height. Ocellars strong and erect; one row of postorbitals. Genae silvery grey with numerous black setae, about 0.7-0.34 of eye height. Antenna and palpus black, 3rd antennal segment 1.2-2.0 times as long as 2nd, arista micropubescent, inflated basally at ⅖-½. Distance between vibrissal angles equals or is longer than distance between vibrissal base and oral margin.

Thorax grey pollinose with 3 dark longitudinal stripes dorsally. ac 0-2+2-3, dc 2-3+3-4, ia 0-1+3, h 2-4, ph 1-2, spl 1+1. Scutellum grey, in basal part black, with 3 pairs of strong marginals and 1-3 pairs of fine discals. Legs black, $t_2$ with 2-3 ad. Wings hyaline, basicosta and epaulet brown to black. Costal spine absent. Ratio of 3rd and 5th costal section 1 : 0.9-1.3, m-cu slightly sigmoid, rather straight.

Abdomen grey pollinose with three elongate spots on each of tergites I+II-V, spots on tergite V often reduced. Tergites I+II and III with pair of medial marginals, tergites IV and V each with a row of marginals, genitalia black, grey dusted.

Body length 6.0-11.5 mm.

**Distribution:** Europe except British Isles, eastwards to Altai Mts. Larvae are inquilines in nests of *Psenulus* sp. (Sphecoidea). Flies frequent hygrophytous forests, especially the outskirts.

### *Macronychia (Moschusa) alpestris* Rondani, 1865

Atti Soc. ital. Sci. nat. 8: 218.

*Miltogramma conica* Bezzi, 1907, Katal. pal. Dipt. 3: 519. *(Macronychia)* (nec. Robineau-Desvoidy 1830).
*Miltogramma dumosa* Pandellé, 1895, Revue Ent. 14: 301.

#### Description

♂. Eyes separated at level of posterior ocelli by a distance equal to 0.33-0.40 of head width; frontal

stripe brown to black, parallelsided, 1.2-2.0 times broader than parafrontal; fr 9-15, or 1+2-3, parafrontal silvery grey or white pollinose, covered with numerous black hairs; parafacial silvery grey dusted, at antennal base about 0.37-0.44 eye-height, with 4-6 vertical rows of black setae. Ocellar bristles strong, one row of postorbitals. Genae silvery grey, with numerous black bristles, about 0.35-0.45 eye-height. Antenna and palpus black, 3rd antennal segment 1.1-1.5 times as long as 2nd, arista bare, inflated at its proximal ⅓-½, distance between vibrissal angles shorter than distance between vibrissal base and oral margin.

Thorax grey dusted, mesonotum with 3 dark longitudinal stripes, ac 3-4+2-3, dc 2-3+3, ia 0-1+3, h 4-6, ph 1-2, spl 1-2+1. Scutellum with three pairs of strong marginals and one pair of fine dicals. Legs black, grey dusted, $t_2$ with 2-4 ad. Wings hyaline, basicosta and epaulet brownish black, costal spine absent, ratio of 3rd and 5th costal sections 1 : 1.0-1.4, m-cu sigmoid.

Abdomen black, grey dusted, tergites each with 3 elongate dark spots, tergite V often with reduced pattern. Genitalia black, grey dusted. Tergites I+II with or without marginals, tergite III with pair of erect madial marginal bristles, tergites IV and V each with row of marginals.

Body length 6-13 mm.

**Distribution:** Southern and central Europe, Transcaucasia, central Asia and Mongolia. Larvae are inquilines in cells of Eumenidae: *Eumenes* sp., *Odynerus parietum* L. and Vespidae: *Polistes gallicus*.

### *Macronychia (Moschusa) griseola* (Fallén, 1820)

Monogr. Mus. Svec.: 10 *(Tachina)*.

**Description**

♂. Eyes separate at level of posterior ocelli by distance equal to 0.30-0.33 of head width; frontal stripe dark brown to black, parallel-sided, 1.2-1.7 times broader than one parafrontal; parafrontal grey dusted, with numerous fine black hairs, fr 7-14, or 1+2. Parafacial grey dusted, with 2-3 vertical rows of black fine bristles, genal groove dark reddish. Ocellars strong, one row of postorbitals. Gena grey with numerous black setae. Antenna and palpi black, 2nd antennomere somewhat reddish on apical margin; 3rd antennal segment 1.1-1.6 times as long as 2nd, arista micropubescent, basally inflated at ⅖-½. Distance between vibrissal angles equals distance between vibrissal base and oral margin.

Thorax densely grey pollinose, postsutural area with narrow medial brown stripe. ac 2-3+3-4, dc 2-3+3-5, ia 0-1+3, h 3-7, ph 2-3, spl 1+1. Scutellum with 3 pairs of strong marginals and 2-4 pairs of fine discals. Legs black, grey dusted, $t_2$ with 2-3 ad. Wings hyaline, basicosta and epaulet yellow. Costal spine absent, ratio of 3rd and 5th costal sections 1 : 0.9-1.2, m-cu slightly S-shaped.

Abdomen almost unicolorous grey, with narrow medial olivebrown stripe. Tergites I+II without marginals; tergite III with pair of medial marginal bristles, tergites IV and V each with row of marginals. Genitalia black, densely grey dusted. Body length 4-8 mm.

**Distribution:** Palaearctic and Oriental (China, Taiwan) regions. Flies frequent mesophytic meadows where they feed at flowers, especially Boraginaceae, Lamiaceae, Euphorbiaceae, Apiaceae and Asteraceae.

### *Macronychia (Moschusa) polyodon* (Meigen, 1824)

Syst. Beschr. 4: 302 *(Tachina)*.

**Description**

♂. Eyes separate at level of posterior ocelli by a distance equal to 0.24-0.31 of head width; frontal stripe brownish black, parallell-sided, 1.8-2.3 × broader than parafrontal. fr 9-14, or 1+2, parafrontal silvery grey dusted, slightly yellowish, densely haired. Parafacial silvery grey dusted, with 1-3 irregular rows of fine bristles, at level of antennal base about 0.22-0.32 of eye height, genal groove reddish. Ocellars strong, one row of postorbitals. Genae silvery grey, with numerous black setae at about 0.25-0.35 of eye height. Antennae and palpi black. 3rd antennomere 1.2-1.5 times as long as 2nd. Arista micropubescent, inflated in basal ⅖-½. Distance between vibrissal angles equal to distance between vibrissal base and oral margin.

Thorax grey dusted, mesonotum with 3 black to brown longitudinal stripes. ac 2-3+2-3, dc 2-3+3,

ia 0-1+2-3, h 3-6, ph 1-3, spl 1+1. Scutellum with 3 pairs of strong marginals and 1-2 pairs of fine discals. Legs black, grey dusted, $t_2$ with 2-3 ad. Wings hyaline, often slightly fumose, basicosta and epaulet brown to black. Costal spine absent, ratio of 3rd and 5th costal sections equals 1 : 0.9-1.5; m-cu S-formed.

Abdomen grey dusted, with 3 brown or black triangular spots on all tergites, spots coalescing at hind margin. Genitalia black, densely grey dusted. TergiteS I+II without medial marginals, tergite III with pair of marginals, tergites IV and V each with row of marginal bristles.

Body lenth 5-11 mm.

**Distribution:** Paleaearctic, ranging from the British Isles to Japan. Larvae are inquilines in nests of Sphecoidea: *Crabro, Crossocerus, Ectemnius, Oxybelus, Pemphredon* and Apoidea: *Bombus hortorum, B. terrestris.* Flies frequent outskirts of mesophytic forests, feeding at flowers of various herbs, e. g. Apiaceae, Asteraceae, Euphorbiaceae.

## Subfamily Miltogrammatinae Brauer & Bergenstamm, 1889

Denkschr. Akad. Wiss. Wien 1889, 56: 113.

Small to medium-sized flies (2-12 mm). Arista bare or micropubescent, head proportions very different. Eyes large, genae in profile distinctly narrower than half of eye height. Frons with proclinate orbitals in both sexes. npl 2 with or without additional hairs. spl 1+1, 1+2 or 1+2, hind coxae bare caudally. Mid tibia usually with 1 ad, less frequently with 2-4 ad. Posterior thoracal spiracle operculate with two subequal bristles or unequal lappets. ♂ postabdomen with well developed VIth tergite, segment VII+VIII complete. Surstyli usually elongate; aedeagus complete, acrophallus present, epiphallus usually well developed. ♀ with short telescopic ovipositor; all tergites of ♀ postabdomen present, VIIth and VIIIth tergites often bilobate, tergite VI usually complete. Spermathecae oval or elongate, not differentiated. 6th and 7th spiracles usually situated on tergite VI, but exceptionally (in *Apodacra, Miltogrammatidium)* the 7th spiracle is situated on tergite VII.

Some 600 species worldwide except New Zealand and subarctic (or arctic) zones. The majority of the taxa prefer dry habitats. Larvae are inquilines in nests of various wasps and bees, one species, viz. *Senotainia tricuspis*, is a parasite of adult bees, some species develop in nests of ants and termites. Flies frequently feed at flowers. First instar larvae of the genera *Senotainia, Taxigramma, Metopia, Paragusia* are usually deposited on decomposing corpses of such insects as wasps, bees, flies, crickets and orthopterans. In the abdomen ♀ *Metopia* usually only 6 or 7 larvae are capable of development and are usually stouter than the other ones which are obviously less active and not capable of successful development (own experience and Richet 1990).

**References:** Rohdendorf 1930-1975: Fliegen palaearkt. Region, 11, 64h: (Lf. 39, 1930): 1-48, Lf. 88, 1935: 49-128, Lf. 285, 1971: 129-176, Lf. 311, 1975: 177-232. Kurahashi 1972: Kontyu 40 (3): 173-180; Mihályi 1979: Fauna Hung. 135 (16): 63-94. Rohdendorf & Verves 1980: Insects of Mongolia 7: 445-517 (in Russian). Pape 1987: Fauna ent. Scand. 19: 27-78: Verves 1989: Jap. J. Med. Sci. Biol. 42: 111-126; Fan 1992 (ed.): Key to the common flies of China: 585-611.

### Key to the genera, subtribes and tribes of Miltogrammatinae

1. Hair-like proclinate orbital bristles numerous. Head profile rounded (Amobiini) ..... *Amobia* R. D.
– 1-6 proclinate orbital bristles. Head profile different ........ 2.

2. Wing cell $R_5$ closed or petiolate ........ 3.
– Wing cell $R_5$ open at wing margin ........ 6.

3. Oral bristles with exception of 1-2 pairs of vibrissal bristles absent. Cell $R_5$ long-petiolate (Miltogrammatini: Apodacrina) ........ *Apodacra* Mcq.
– Oral bristles numerous, well developed, black. Cell $R_5$ short petiolate or closed (Metopiaini: Taxigrammatina) ........ 4.

4. Arista shortly haired, longest hairs slightly longer than greatest orbital diameter .......................... ........................................ *Hilarella* Rd.
– Arista bare ........................................ 5.

5. Length of apical and preapical sections of cu equal. Claws of ♂ legs short, not more than 0.8 times length of 5th tarsomere. 3rd antennomere 2.3-4.0 times as long as 2nd ................ *Paragusia* Schin.
– Apical section of cu longer than preapical section. Claws of ♂ legs elongate and as long as 5th tarsomere. 3rd antennomere 1.5-2.0 times as long as 2nd ..................................... *Taxigramma* Perris

6. Antennal base situated under half of eye height: vibrissal angles situated at oral margin (Phyllotelini) ........................................ 7.
– Antennal base situated at level of half of eye height: vibrissal angles at or above oral margin ..... ........................................ 8.

7. Arista more or less flattened, wings of ♂ spotted (Phyllotelina) ................................ *Phylloteles* Löw
– Arista bristle-like, not flattened, ♂ wings hyaline (Metopodiina) .............................. *Metopodia* B. B.

8. Vibrissae not differentiated from other oral bristles. Mid tibia with 2-4 strong ad bristles (Miltogrammatini: Miltogrammatina) ........................................ 9.
– Vibrissae longer and thicker than other oral bristles ........................................ 12.

9. Head profile rounded, frons and facials narrow, not more than 0.25 times head width ............ 10.
– Head profile angular, frons and facials broader ........................................ 11.

10. ♂: Epandrium large and broad, basiphallus elongate and thick, epiphallus reduced, fore tarsus without erect bristles or hairs. Abdomen black with grey pollinose transverse bands interrupted by medial black stripe ........................................ *Cylindrothecum* Rohd.
– ♂: Epandrium small, basiphallus short, epiphallus well developed, elongate, fore tarsus with erect bristles or hairs. Abdomen with black spots or bands .............................. *Miltogrammatidium* Rohd.

11. 1st-5th tarsomeres of fore tarsus in ♂ with long erect bristles, epiphallus reduced, pregonites bilobed. Oral margin profile slightly projecting, frontal vitta ........................ *Nacanthothecum* Rohd.
– 1st antennomere of fore tarsus in ♂ without bristles, epiphallus elongate, well developed, pregonites hook- or spine-formed. Oral margin profile well projecting, frontal vitta often widened backwards. Abdomen with chequered pattern or black spots ................................ *Miltogramma* Mg.

12. Vibrissal angles retreating, much less prominent than frons ........................................ 13.
– Vibrissal angles as prominent as frons or only slightly less prominent (Miltogrammatinae: partim) ........................................ 18.

13. ♂ cerci distinctly curved dorsally. Frons narrower than eye, abdomen oval. Basal ¾ or more of arista inflated (Oebaliini) ........................................ 14.
– ♂ cerci straight. Frons wider than eye, abdomen conical (Metopiaini) ........................................ 15.

14. Facial ridge with 4-7 bristles, abdomen grey pollinose, without spots. Claws elongate, about as long as 5th tarsomere ........................................ *Ptychoneura* B. B.
– Facial ridge with short hairs on lower part. Abdomen with black spots. Claws curved, shorter than 5th tarsomere ........................................ *Oebalia* R.-D.

15. Facial ridge with a row of strong bristles. Wings of ♂ spotted (Sphenometopiina) ........................ ........................................ *Sphenometopa* Towns.
– Facial ridge bare, ♂ wings without spots ........................................ 16.

16. Parafacials with a vertical row of bristles along inner margin (Metopiina) .................. *Metopia* Mg.
– Parafacials without a row of bristles along inner margin ........................................ 17.

17. Arista inflated at base. ♂ with broad longitudinal black stripe on mesonotum and abdomen, ♀ silvery grey, with 3 spots on each abdominal tergite (Mesomelaenina) ................. *Mesomelaena* Rd.

– Arista inflated in basal ½-¾. Both sexes grey, abdomen with lustrous black bands at base of tergites or with chequered pattern (Phrosinellina) .................... *Phrosinella* R.-D.

18. Claws of fore legs in ♂ elongate, as long or more than 5th tarsomere. Notopleuron with only 0-3 hairs in addition to usual 2 bristles (Senotainiina) .................... *Senotainia* Mcq.

– Claws of fore legs in ♂ short, not more than 0.8 times as long as 5th tarsomere. Notopleuron with not less than 5 hairs in addition to usual 2 bristles (Pterellina) .................... 19

19. Presutural dc well developed. Frons width not less than eye width. Abdomen with chequered pattern, spots poorly developed. Cerci in ♂ not elongate, abdominal tergite V without long ventral bristles .................... *Pterella* R.-D.

– Presutural dc absent or hair-like. Frons narrower than eye. Abdomen with black spots or bands, at base yellowish, red ventrally. Cerci of ♂ elongate and narrow, abdominal tergite V ventrally with long and thick serrate bristles directed backwards .................... *Protomiltogramma* Towns.

## Tribe Miltogrammatini B. B.

This is obviously an ancestral group of the subfamily. Adult flies are grey and of medium or small size, abdomen with spots or bands, in andvanced genera with chequered pattern. Lower margin of head elongate, eyes large, genae narrow, arista bare. Fore tarsus of ♂ often with erect setae, ventral processes of paraphallus well developed. Facial bristles and other groups of chaetom often partly or completely reduced. About 300 species in 26 genera are well established in the Old World as evidenced by high species diversity, and the Americas.

### Subtribe Senotainiina Rohdendorf, 1930

Fliegen palaearkt. Reg. 11 (64h), Lf. 39: 9.

This subtribe is characterized by the following plesiomorphic features: claws in ♂s elongate, as long as or longer than 5th tarsomere, frons, parafacials and genae moderately wide, 3rd antennomere 1.5-2 times as long as 2nd, abdominal tergites with black spots. Parafacial setae more or less reduced, body length small or medium sized. Two genera comprising some 60 species are distributed in the Old World and the Americas.

### Genus *Senotainia* Macquart, 1844

Mém. Soc. Sci. Agric. Lille, 295.
**Type species:** *Senotainia rubriventris* Macquart, 1846.

Grey, medium-sized or small flies (3-9 mm). Parafacials rather broad, vibrissae well developed. or 1-2+1. Wings hyaline, cell $R_5$ open. The genus comprises three subgenera and about 50 species distributed in all zoogeographical regions. Adult flies frequent dry habitats, often in sandy areas, and visit flowers of various species of Apiaceae, Asteraceae, Euphorbiaceae, Lamiaceae etc. ♂♂ gather in preconnubial aggregations on open ground, sandy mounds etc.

**References:** Rohdendorf 1935: Fliegen palaearkt. Reg., 11 (64 h), Lf. 88: 79-89; Séguy, 1941: Encycl. ent. (A) 21: 277-284; Pape 1987: Fauna ent. Scand. 19: 40-45.

### Key to the subgenera and species of *Senotainia*

1. Prementum elongate, 6-10 times longer than wide (subgenus *Senotainia* s. str.) (Figs 6, 7) .......... 2.

– Prementum comparatively short, 3-4 times longer than wide (subgenus *Sphixapata*) (Figs 8, 9) .... .................... 3.

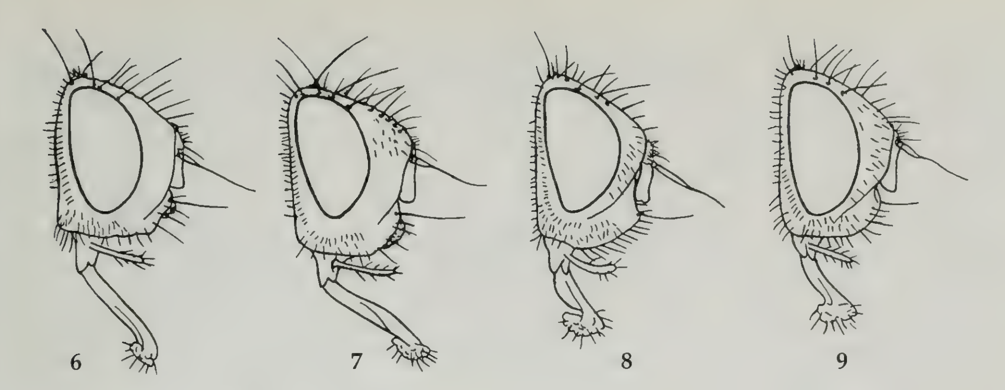



**Fig. 6.** *Senotainia conica.* Male head, laterally.
**Fig. 7.** *Senotainia tricuspis.* Male head, laterally.
**Fig. 8.** *Senotainia puncticornis.* Male head, laterally.
**Fig. 9.** *Senotainia albifrons.* Male head, laterally.

2. Palpi brown to black. Parafacial plate hairy (Fig. 6). Profile of ♂ cerci broad, rostriform, aedeagus elongate (Fig. 6) ........................ *Senotainia* (s. str) *conica* (Fall.)
– Palpi yellow. Parafacial plate bare (Fig. 7). ♂ cerci narrow, almost straight, aedeagus short and thick (Fig. 11) ........................ *Senotainia* (s. str.) *tricuspis* (Mg.)
3. Arista inflated in its proximal half or more. Vibrissa situated at about level of lower eye margin (Fig. 8).
♂: 3rd antennomere 2.5 times longer than 2nd, pregonites not serrate on dorsal margin. Acrophallus rounded (Fig. 12) ........................ *Senotainia* (*S.*) *puncticornis* (Zett.)
– Arista inflated in proximal 0.3-0.4, vibrissa situated distinctly above level of eye margin (Fig. 9).
♂: 3rd antennomere about 2.0 times longer than 2nd, pregonites serrate on dorsal margin, acrophallus pointed (Fig. 13) ........................ *Senotainia* (*S.*) *albifrons* (Rd.)

### Subgenus *Senotainia* s. str.

About 30 species distributed in all zoogeographical regions. Imagines psammophilous prefering dry habitats, especially on river shores, secondary distribution in changed biotopes (biocenoids), e.g. vacant plots of land.

### *Senotainia* (s. str.) *conica* (Fallén, 1810)

K. Vetensk. Akad. Handl (2) 34: 270 *(Tachina).*

**Description**

♂. Frons at vertex 0.32-0.35 and at antennal base 0.27-0.32 head width. Frons, facials and genae silvery grey pollinose, upper part of frontal vitta and frons at vertex with a brownish hue. Frontal vitta at level of fore orbital bristle about 1.1-1.5 times wider than parafrons, and 1.5-2.0 times broader backwards. Antennae black, 3rd antennomere 1.3-1.8 times as long as 2nd, arista inflated in basal third. Parafacial at level of antennal base about 0.2-0.3 and genae 0.16-0.22 eye height. Two regular rows of postorbital bristles, fr 6-10, Parafacials with numerous short black hairs (Fig. 10), genae and hind surface of head with numerous black bristle-like hairs. Palpus dark brown to black.

Thorax silvery grey pollinose, mesonotum with 3 poorly defined narrow longitudinal stripes. ac 1-2+2, dc 2+3, ia 0+2-3, h 2-3, ph 1, spl 1+1. Legs black, wings hyaline, basicosta and epaulet yellow. Abdomen yellowish grey dusted, with pair of poorly defined lateral black spots and often with brown

medial spot on each tergite, tergite I+II without marginals, tergites III and IV with pair of erect marginal bristles, tergite V with row of marginals. Genitalia robust and protruding, black, with yellowish grey pollinosity. Cerci (Fig. 10) in apical part broad, spine- or hooklet-formed, epiphallus absent, acrophallus elongate.

♀. Head slightly paler than in ♂, parafacials bare or with very few hairs, spots on abdominal tergites smaller, tergite VI black, grey pollinose.

Body length 3-6 mm.

**Distribution:** A widely distributed transpalaearctic species: British Isles throughout Europe and Asia to Far East. Imagines prefer grassland habitats: sandy alluvial plains and lowland meadows, grass-plots and outskirts of forests, mainly of mesophytic character. Larvae are inquilines in nests of Sphecoidea: *Bembix integra* Pz., *Crabro peltarius* Schreb., *C. scutellatus* Schev., *Oxybelus uniglumis* L., *Philanthus triangulum* F., *Sphex albicestus* Lep., *Tachysphex unicolor* Pz. and Apoidea: *Halictus lucidulus* Schenck, *H. subauratus* Rossi.

**References:** Tiensuu 1939, Séguy 1941a, Pape 1987b.

### *Senotainia* (s. str.) *tricuspis* (Meigen, 1838)

Syst. Beschr. 7: 234 *(Miltogramma).*

**Description**

♂. Frons at vertex 0.33-0.38 and at level of antennal base 0.30-0.36 head width. Frontal vitta, lunula, parafacials and mediana silvery yellow pollinose; vertex, orbitae, parafrons, genae and postgenae blackish, grey dusted. Frontal vitta at level of anterior orbital bristles about 1.5-2.0 times broader than parafrons, 1.5-2.5 times wider backwards. Antennae black, 3rd antennomere 1.5-2.0 times as long as 2nd, arista inflated in basal 0.3-0.4. Parafacials at level of antennal base about 0.25-0.35 and genae 0.20-0.26 eye height. One regular row of postorbital setae, fr 10-15, parafrons with numerous black setae, parafacials bare (Fig. 7). Genae and occiput with numerous erect black hairs. Palpus yellow.

Thorax grey dusted, mesonotum with 3 narrow black longitudinal stripes. ac 2-3+1-3, only the prescutellar pair strong and long, dc 2+3, ia 0-1+2-3, h 3-6, ph 2-3, spl 1+1, between these bristles numerous shorter bristle-like hairs. Legs black, wings hyaline, basicosta yellow, epaulet black. Abdomen with grey pollinosity and with 3 elongate black spots on each tergite. Tergites I+II without marginals, such bristles on tergite III present or absent, tergites IV and V with row of marginals. Genitalia small, black, slightly grey dusted. Epiphallus short, pointed (Fig. 11), acrophallus rounded and broad, cerci apically narrowed, elongate.

♀ like ♂, but abdominal spots more or less reduced.

Body length 5-9 mm.

**Distribution:** This species is widely distributed in Europe, North Africa, Transcaucasia, South Siberia and Mongolia. Adult flies are xerophilous preferring sandy habitats, frequenting flowers, often in bee gardens, where females waylay bees. They pursue passing bees and deposit up to several larvae (1 to 6) on a bee body. Larvae penetrate the jugular membrane of the bee and enter the body cavity; one female fly can produce 100-400 or more larvae. The larvae live in the thorax and feed on haemolymph and muscle tissue. Bees infested perish within 2-3 days after invasion. The adult larvae develop in the hosts body for several days (duration of larval development lasts 6-11 days), pupation takes place in the soil at a depth of about 10 cm. The metamorphosis in the puparium lasts up to 72 days. The species is probably multi-voltine in central Europe. Hosts are *Apis mellifera* L. and other apids – *Bombus muscorum* L., *Halictus* spp. The myiasis or sickness caused by *S. tricuspis* is known as "senotainiasis" and can be of economic importance (Boiko 1939, 1948, 1963, Mathis 1957, 1975). The larvae have been found in nests of sphecoid wasps (*Ectemnius rubicola* Duf. & Perris and *Philanthus* sp. – Séguy 1941a), *Oxybelus bipunctatus* Ol. (Verves & Gorobehishyn, 1995) but possibly a misidentification is involved.

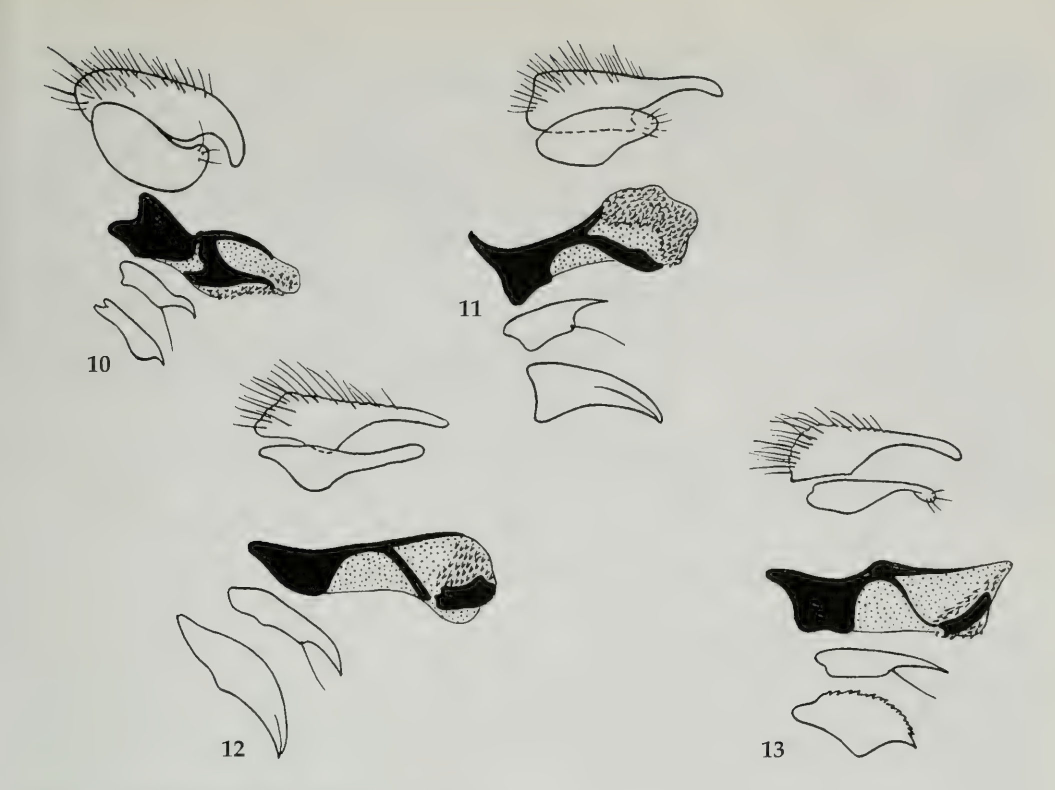



**Fig. 10.** *Senotainia conica.* Male genitalia, laterally.
**Fig. 11.** *Senotainia tricuspis.* Male genitalia, laterally.
**Fig. 12.** *Senotainia puncticornis.* Male genitalia, laterally.
**Fig. 13.** *Senotainia albifrons.* Male genitalia, laterally.

### Subgenus *Sphixapata* Rondani, 1859

Dipt. Ital. Prodr. 3: 225:
**Type species:** *Sphixapata albifrons* Rondani, 1859:

*Arrhenopus* Brauer & Bergenstamm, 1891. Denkschr. Akad. Wiss. Wien 58: 360.
**Type species:** *Sphixapata piligena* Rondani 1865 (syn. of *S. puncticornis* Zett.).

About 20 species occur in the Old World, the majority being psammophilic taxa.

### *Senotainia (Sphixapata) puncticornis* (Zetterstedt, 1859)

Dipt. Scand. 13: 6149 *(Miltogramma).*

*imberbis* Zetterstedt, 1838, Insecta Lapp. 636 *(Tachina)* (om. preocc. by Wiedemann 1830).
*piligena* Rondani, 1865 Atti Soc. ital. Sci. nat. 8: 217.
*crabrorum* Kramer, 1920 Zool. Jahrb. Syst. 43: 329 *(Ptychoneura).*

#### Description

♂. Frons at vertex 0.30-0.34 and at antennal base 0.23-0.30 head width. Parafrons, parafacials and genae silvery white dusted, lunula and occiput grey dusted, frontal vitta black, slightly yellow or white pollinose. Frontal vitta at fore fr 1.4-2.0 times as broad as parafrons, 1.3-1.7 times wider backwards. Antennae black, 3rd antennomere 2.0-2.8 times length of 2nd, arista inflated in basal 0.5-0.7. Parafacials

at antennal base 0.26-0.32 and genae 0.21-0.31 times eye height. 1-2 regular rows of postorbital setae, fr 8-12, parafacials with numerous black setae (Fig. 8), gena and occiput with erect black bristle like hair. Palpus yellow, widened apically.

Thorax grey or yellowish grey pollinose, mesonotum with three narrow brownish stripes. ac 2-3+3-4, dc 2-3+3, ia 1+2-3, h 2-3, ph 1, spl 1+1 with numerous bristles in between. Legs black, wings hyaline, basicosta and epaulet yellow. Abdominal tergite I+II without medial marginals, these bristles absent or present on tergites III-V, each with a row of marginals. Abdomen yellowish grey dusted, with three elongate black or brownish spots on each tergite, those on tergite V often reduced. Genitalia medium-sized, black, slightly yellowish grey dusted. Cerci and surstyli elongate and narrow (Fig. 12), pregonites hook-formed, not serrate on dorsal surface. Epiphallus absent, acrophallus short and thick, rounded.

♀. Frons at vertex 0.24-0.30 and at level of antennal base 0.22-0.27 head width. 3rd antennomere not more than 1.5 times length of 2nd. Abdomen distinctly brightly dusted and with spots partly reduced. Body length 4-6.5 mm.

**Distribution:** Central and northern Europe, South Siberia and Far East. Adult flies prefer mesophytic outskirts of forests and bushes. Larvae are inquilines in the nests of Sphecoidea (e.g. *Crossocerus cinxius* Dhlb.) in dry stems (Kramer 1920).

## *Senotainia (Sphixapata) albifrons* (Rondani, 1859)

Dipt. Ital. Prodromus 3: 225 *(Sphixapata)*.

### Description

♂. Frons at vertex 0.24-0.30 and at antennal base 0.22-0.28 head width. Head silvery grey dusted, frontal vitta often blackish, at fore or 1.5-2.5 times broader than parafrons, 1.5-2.5 wider backwards. Antennae black, 3rd antennomere 1.2-2.0 times longer than 2nd, arista inflated in basal 0.3-0.4. Parafacials at antennal base about 0.23-0.27 and genae 0.16-0.20 eye height. One regular row of postorbital setae. fr 7-10, parafacials with numerous or few short black setae (Fig. 9), genae and occiput with bristle-like black hairs. Palpus black, not widened at apex.

Thorax grey, longitudinal stripes on mesonotum narrow and poorly developed. ac 2+2-3, dc 2+3, ia 0-1+2-3, h 2-3, ph 1, spl 1+2-3, with numerous black setae in between. Legs black, wings hyaline, basicosta and epaulet yellow. Abdomen grey dusted, with three elongate spots on tergites I+II-IV, spots on tergite V more or less reduced. Tergites I+II without marginals, marginals on tergite III present or absent, tergites IV-V each with row of marginal bristles. Genitalia small, grey. Cerci and surstyli elongate and narrow (Fig. 13), pregonites widened, serrate on dorsal surface. Epiphallus reduced, acrophallus wide, pointed at apex.

♀. Grey coloration deeper than in ♂, abdominal spots usually reduced or absent.

Body length 4.0-8.5 mm.

**Distribution:** The species is widely distributed in the southern and central parts of the Palaearctic region and in the Afrotropical and Oriental regions. Adult flies prefer sandy areas and dry grassland including meadows, dry margins of roads etc. Larvae are inquilines in nests of sphecoid wasps: *Philanthus triangulum* F., *Prionyx pollens* Khl., *Sphex subtruncatus* Dhlb. (Charykuliev & Myartzeva 1964, Verves 1979b).

## Subtribe Pterellina Rohdendorf, 1967

Trudy Paleontol. lnst. Acad. Sci. USSR 116: 63:

This subtribe is closely related to the subtribe Senotainiina, but differs by shorter claws of males, elongate 3rd antennomere and very narrow genae; vibrissae long and straight, eyes large, parafacial bristles more or less reduced. Four genera and about 60 species are distributed in the Old World and Australia.

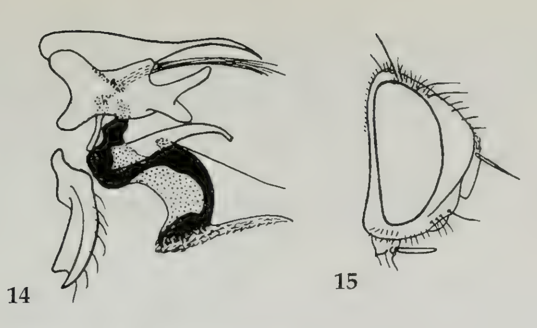



**Fig. 14.** *Protomiltogramma fasciata*. Male genitalia, laterally.
**Fig. 15.** *Protomiltogramma fasciata*. Male head, laterally.

### Genus *Protomiltogramma* Townsend, 1916

Can. Ent. 48: 154.
**Type species:** *Protomiltogamma cincta* Townsend, 1916.

*Thereomyia* Rohdendorf, 1927, Zool. Anz. 71: 163 (**Type species:** *Miltogramma fasciata* Meigen, 1924).

**References:** Verves 1987: Ent. Obozr. 66: 654-664.

Dark greyish medium-sized or small flies (4-12 mm long) Frons and facials narrow, head profile angular, presutural acrostichals absent, abdominal tergite V in ♂ with numerous long and thick ventral bristles, acrophallus narrow and long, cerci in apical part awl-like, abdomen with black spots or bands. Adult flies prefer psammophilous habitats. Larvae are inquilines in nests of various sphecoid wasps. About 25 species are distributed in the southern parts of the Palaearctic region, and in the Oriental, Afrotropical and Australian regions.

### *Protomiltogramma fasciata* (Meigen, 1824)

Syst. Beschr. 4: 227 *(Tachina)*:

**Description**

♂. Frons at vertex 0.26-0.30 and at antennal base 0.22-0.27 head width. Parafrons, facials, lunula and genae silvery white pollinose. Frontal vitta yellow to brown, without pollinosity, dull, parallel-sided, at fore orbitals 1.1-1.3 times as wide as parafrons. Antenna yellow, apical narrowed part of arista black, 3rd antennomere 2.5-3.5 times as long as 2nd, arista thickened in basal 0.5-0.6. Parafacials at level of antennal base about 0.19-0.24 and gena 0.05-0.10 eye height. 2 regular rows of postobrbitals, fr 8-14, long and strong, orbitals 1+2, strong, parafrons at vertex with several short reclinate bristles. Parafrons and parafacials practically bare, with microscopic fine yellow setae. Oral bristles numerous, black; fore part of genae with short erect yellow hairs, occiput and postgenae short black haired. Palpus short, apex slightly inflated, yellow. Occiput grey dusted (Fig. 15).

Thorax grey dusted, mesonotum dark grey pollinose, with three longitudinal black stripes, scutellum grey, hind part of scutellum with black shortly bristled spots. ac 0+1, dc 0+1-1+2, only prescutellar pair strong, ia 0+1, h 3, ph 1, npl 2, surface of notopleura with numerous black erect hairs, spl 2+2, haired, propleura bare. Scutellum with 3 pairs of erect marginals, discals poorly defined. Fore tarsus without erect bristles or hairs, $t_2$ with 1 long and with some short ad in middle part. Legs black, grey dusted. Wings hyaline, basicosta and epaulet yellow. Costal spine absent, $R_5$ open, $r_1$ bare, $r_{4+5}$ with 2-4 black hairs at base, angle of m-vein straight, m-cu slightly curved, ratio of 3rd and 5th sections of costa 1:3-4. Abdominal tip yellowish red, tergites silvery grey dusted. TergiteS I+II black, tergites III-V each in basal half black lustrous with narrow medial longitudinal stripe, tergites I+II without erect medial marginals, last tergites each with a row of marginals. Genitalia small (Fig. 14).

♀. Frons at vertex 0.28-0.40 times head width, black stripes of abdominal tergites wider than in ♂. Body length 4-10 mm.

**Distribution:** South and Central Palaearctic from France to Japan, being most prevalent in sandy areas. Larvae develop in nests of sphecoid wasps *Bembex* sp. (Séguy 1941a), *Liris japonica* Kohl, *Sphex argentatus fumosus* Mocz., *S. flammithrichus* Strand (Kurahashi 1973), *Philanthus triangulum* (Myarzeva 1972).

## Genus *Pterella* Robineau-Desvoidy, 1963

Hist. Nat. 2: 121.
**Type species:** *Miltogramma grisea* Meigen, 1824.

*Setulia* Robineau-Desvoidy, 1863, Hist. Nat. 2: 124 (**Type species:** *Setulia cerceridis* Robineau-Desvoidy, 1863) (syn. of *Miltogramma grisea* Meigen, 1824).

**References:** Rohdendorf 1935, Fliegen palaearkt. Region 11 (64h), Lf. 88: 65-71; Séguy 1941: Encycl. ent. (A) 21: 260-265; Venturi 1960: Frust. ent. 2, 7: 44-49.

Grey flies, mostly medium-sized or small (4-8 mm). Frons wide or narrow, head profile angular. Parafacials wide, nearly bare; genae narrow, 3rd antennomere 2-4 times as long as 2nd, arista bare. Presutural dorsocentrals present. Wings hyaline, cell $R_5$ open. Abdomen with grey chequered pattern. About 20 species in Palaearctic, Oriental and Afrotropical regions. Adult flies frequent open mesophytic meadows, grassland and bushes, feeding at flowers of Apiaceae, Asteraceae, Euphorbiaceae etc.

### Key to species of *Pterella*

1. ♂ .......... 2.
– ♀ .......... 5.

2. Frontal vitta at least twice wider posteriorly, frons at antennal base distinctly narrower than at vertex, 4th tarsomere of fore tarsus with elongate single ad and pv, these bristles as long as 5th tarsomere. Antennae yellow .......... *P. convergens* (Pand.)
– Frontal vitta at least 1.5 wider caudally, frons at antennal base slinghtly narrower than at vertex. Fore tarsus with different chaetotaxy. Antennae partly grey .......... 3.

3. 4th tarsomere of fore tarsus with numerous pv, p and pd posterionly, these bristles distinctly longer than 5th tarsomere .......... *P. penicillaris* (Rd.)
– 4th tarsomere of fore tarsus without bristles .......... 4.

4. Abdominal tergite V mostly completely black, with numerous short adjacent black bristles, tergite IV and rarely III with lateral blackish spots .......... *P. melanura* (Mg.)
– Abdominal tergite V without bristled spots, with chequered pattern in apical 0.3-0.5 with lustrous black band .......... *P. grisea* (Mg.)

5. Frontal vitta twice wider caudally, frons at antennal base markedly narrower than at vertex .......... *P. convergens* (Pand.)
– Frontal vitta at least 1.5 times wider caudally, frons at antennal base slightly narrower than at vertex .......... 6.

6. Frons at least 0.32 head width, arista inflated in basal 0.3-0.4. Frontal vitta at fore orbitals not more than 1.5 times broader than one parafrons, its fore part ochreous yellow, without pollinosity. or 1+4-5. Abdomen with grey chequered pattern, without lustrous black areas .......... *P. penicillaris* (Rd.)
– Frons at least 0.33 head width, arista inflated in basal 0.5-07. Frontal vitta at fore orbitals at least 2 times broader then parafrons, unicolorous. or 1+2-3. Abdomen with black lustrous spots or bands in apical part of tergite V, occasionally similar spots on tergite IV .......... 7.

7. Frons at level 0.37 of head width. 3rd antennomere yellow or darkened on surface ...................... ........................ *P. grisea* (Meig.)
– Frons at least 0.37 of head width. 3rd antennomere completely grey or yellowish at base ........... ........................ *P. melanura* (Mg.)

## *Pterella convergens* (Pandellé, 1895)

Revue Ent. 14: 298 *(Miltogramma).*

### Description

♂. Frons at vertex 0.32-0.35 and at antennal base 0.20-0.24 head width. Parafrons, parafacial and lunula yellowish gold dusted, genae silvery dusted. Frontal vitta gold dusted, 2-2.5 times wider posteriorly, at fore orbitals 2-3 times as wide as parafrons. Antennae yellow, arista black, 3rd antennomere 3.5-4 times as long as 2nd, arista inflated in basal 0.7-0.8. Parafacials at antennal base about 0.14-0.16 and genae 0.07-0.12 eye height. One regular row of postorbitals, fr 12-16, not very strong, or 1+4-5, strong; parafrons with numerous black erect short bristles, parafacials with very fine black setae. Oral bristles black, strong and numerous. Genae with numerous erect, short yellow hairs, occiput grey dusted and with numerous black setae. Palpi apically broader, yellow. (Head – see Fig. 17).

Thorax covered by numerous medium-length erect hairs, grey dusted. Longitudinal stripes of mesonotum poorly defined, scutellum grey, without lateral spots. ac 0+2, dc 2-3+3-4, ia 0+1-2, npl 2, surface of notopleura covered by 3-4 black setae, spl 1+1-2, with numerous setae, propleuron bare. Scutellum with three pairs of strong marginals and numerous erect discals. 4th tarsomere of fore tarsus (Fig. 21) with elongate apical ad and pv, these bristles as long as 5th tarsomere; $t_2$ with one long and 2-3 short ad in the middle. Legs black. Costal spine absent, $r_1$ bare, $r_{4+5}$ with a few setae at base, angle of m-vein right; m-cu hardly curved, length ratio of 3rd and 5th costal section 1:1.3-1.5. Abdominal tergites I+II and III without strong erect medial marginals. Genitalia small (Fig. 24). Abdomen yellowish grey dusted, with chequered pattern, tergites I-III with narrow longitudinal medial stripe.

♀. Similar to ♂, but fore tarsus without bristles, and frons broader than in ♂, about 0.33-0.37 of head width.

Body length 4.5-7.0 mm.

**Distribution:** Western Palaearctic including Algeria, France, Germany, Poland, Ukraine, Israel and Cyprus. Psammophilous species frequenting sandy habitats. Larvae in nests of the megachilid bee *Anthidium* sp. (in plant associations of *Ferula* in Israel).

## *Pterella grisea* (Meigen, 1824)

Syst. Beschr. 4: 320 *(Miltogramma).*

### Description

♂. Frons at vertex 0.4-0.44 and at antennal base 0.27-0.33 head width. Head yellowish grey dusted, frontal vitta brown, broad, parallel-sided, at fore orbitals 2-2.5 times as wide as parafrons. Antennae more or leass yellow, 3rd antennomere often greyish exteriorly, arista black, 3rd antennomere 2.3-2.8 times as long as 2nd, arista inflated in basal 0.6-0.7. Vibrissae situated well above lower margin of facial plate. Parafacials at antennal base about 0.22-0.26 and genae 0.12-0.19 eye height. 2 regular rows of postorbitals. fr 12-17, or 1+2, strong, parafrons with several long black hairs at vertex, parafacials with fine white hairs. Oral bristles numerous, strong, black. Genae and occiput with black hairs, occiput grey pollinose, palpi yellow.

Thorax grey dusted, longitudinal stripes of mesonotum more or less developed, scutellum grey with lateral black haired spots. ac 2-3+2, dc 2-3+3-4, ph 1-2, npl 2, surface of notopleura covered by 8-10 short black hairs, spl 1+1-2, with numerous long thin hairs, propleuron bare. Fore tarsus without erect bristles or hairs, $t_2$ with one long ad. Scutellum with 3 pairs of strong marginals and one pair of discals. Legs black. 3rd section of costa as long as 5th section; m-cu strongly sigmoid, $r_1$ bare $r_{4+5}$ with several

basal black setae. Basicosta and epaulet yellow. Abdominal tergite III with or without pair of erect medial marginals. Genitalia small (Fig. 23). Abdomen densely yellowish grey pollinose. Tergites with small hind lustrous iridescent, and with small black or brown spots, tergite V with black lustrous hind margin. Margins of tergites with chequered pattern, genitalia black, densely grey dusted.

♀. Similar to ♂, with slightly narrower frons (0.37-0.40 head width).

Body length 5.5-9.5 mm.

**Distribution:** Europe to eastern Siberia and Mongolia; Israel. Preferring mesophytic meadows and grassland. Larvae are inquilines in nests of the sphecoid wasp *Cerceris arenaria* L. (Séguy 1941a).

### *Pterella melanura* (Meigen, 1824)

Syst Beschr. 4: 232 *(Miltogramma).*

#### Description

♂. Frons at vertex 0.38-0.41 (Fig. 18) and at antennal base 0.33-0.37 head width, other head proportions as in *P. grisea*. Head yellowish grey dusted, frontal vitta yellowish brown, pollinosity poor. 1st and 2nd antennomere yellow, 3rd antennomere grey or brownish grey, arista black, 3rd antennomere 1.8-2.3 times as long as 2nd, arista inflated at basal 0.5-0.7. Two regular rows of postorbitals. fr 12-18, or 1+2-3, parafrons at vertex with several long erect black hairs, parafrons and parafacials with pale microscopic setae. Oral bristles black, strong and numerous, genae and occiput with black hairs, occiput grey dusted, palpus yellow. Colour and thorax chaetotaxy, legs and wings similar to *P. grisea*.

Abdominal tergite III with or without erect medial marginals, genitalia small (Fig. 25). Abdomen yellowish grey dusted, with chequered pattern, tergite V mostly completely black with numerous short adjacent bristles, tergite IV and occasionally tergite III with similar lateral spots. (Fig. 22).

♀. Like ♂, but with narrower frons (0.33-0.37 head width), abdominal pattern like in *P. grisea*.

Body length 5.5-8.0 mm.

**Distribution:** Widely distributed in the Palaearctic from France to Far East. The species prefers mesophytic habitats and grassland. Larvae are inquilines in nests of sphecoid wasps, e.g. *Cerceris emarginata* Latr., *C. julii* Fabre, *C. rubida* Latr. (Séguy 1941).

### *Pterella penicillaris* (Rondani, 1865)

Atti Soc. ital. Sci. nat. 8: 216 *(Sphixapata).*

#### Description

♂. Frons at vertex 0.30-0.32 and at antennal base 0.27-0.28 head width. Head yellowish white dusted. Frontal vitta white pollinose, its fore part brownish yellow, without dusted sculpture, at level of fore orbitals 1.3-1.5 times as wide as parafrons, 1.3-1.5 times wider caudally. 3rd antennomere 1.5-1.8 times as long as 2nd, arista inflated at basal 0.3-0.4, 1st and 2nd antennomeres yellow, 3rd antennomere grey or blackish, arista black. Parafacial at level of antennal base 0.14-0.17 and gena 0.06-0.09 eye height. One row of postorbitals; fr 9-13, or 1+4-5, parafrons at vertex with several erect black hairs, fore part of parafrons and parafacials with microscopic pale setae. Oral bristles not very strong, black. Genae pale haired, occiput light grey pollinose, black haired, palpi yellow. (Figs 16, 19).

Thorax and legs black, grey dusted, longitudinal stripes narrow, obsolete, ac 2+2, dc 2+3-4, ia 1+2-3, h 2-4, ph 1-2, npl 2 with 4-6 fine setae, spl 2+2-3. Scutellum with 3 pairs of marginals and 1-2 pairs of discals. Fore tarsus with posterior tuft of long bristles (Fig. 20). 5th section of costa 1.3-1.8 times as long as 3rd section, m-cu curved. Abdominal segment III with pair of erect medial marginals, genitalia small (Fig. 26). Abdomen grey with chequered pattern.

♀. Similar to ♂, fore tarsus without bristles.

Body length 5.5-8.5 mm.

**Distribution:** France, Italy, Hungary, Czechia, Moravia, North Caucasus, Armenia, Tadjikistan, Israel. Ecology unknown, but the flies are psammophilous.

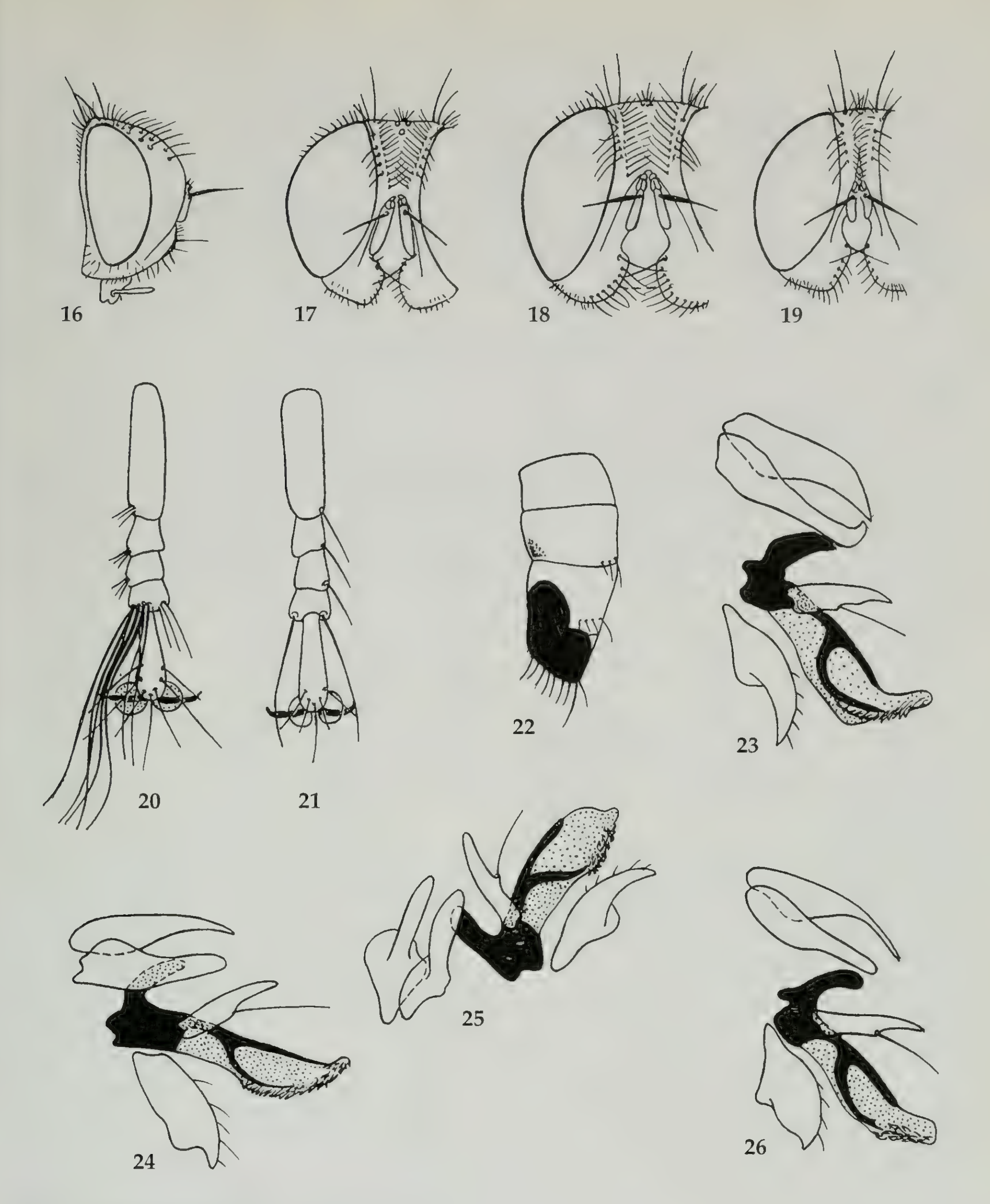



**Fig. 16.** *Pterella penicillaris*. Male head, laterally.
**Fig. 17.** *Pterella convergens*. Male head, frontally.
**Fig. 18.** *Pterella melanura*. Male head, frontally.
**Fig. 19.** *Pterella penicillaris*. Male head, frontally.
**Fig. 20.** *Pterella penicillaris*. Male fore tarsus.
**Fig. 21.** *Pterella convergens*. Dorsal view of male fore tarsus.
**Fig. 22.** *Pterella melanura*. Lateral view of male abdomen.
**Fig. 23.** *Pterella grisea*. Male genitalia, laterally.
**Fig. 24.** *Pterella convergens*. Male genitalia laterally.
**Fig. 25.** *Pterella melanura*. Male genitalia laterally.
**Fig. 26.** *Pterella penicillaris*. Male genitalia, laterally.

## Subtribe Miltogrammatina Brauer & Bergenstamm, 1889

Denkschr. Akad. Wiss. Wien 56: 113.

Medium-sized flies (5-12 mm). Eyes large, gena profile narrow, parafacials usually broad, occasionally narrow, bare or with fine setae. Thoracic bristles partly reduced, ♂ claws short, angular vibrissae reduced. Some 120 species representing 14 genera are widely distributed in the Old World and also (genus *Euphyto*) in the Americas. Majority of species psammophilous, centre of species diversity in deserts of Eurasia and Africa. Flies feed at flowers, larvae live as inquilines usually in nests of various solitary bees, rarely wasps.

### Genus *Anacanthothecum* Rohdendorf, 1930

Fliegen palaearkt. Reg. 11, 64h, Lf. 39: 33.
**Type species:** *Xysta testaceifrons* von Roser, 1840.

Grey, medium-sized flies (6-10 mm) with chequered abdominal pattern, frons narrow, profile angular, parafacials rather broad, genae narrow. Parafacials bare, oral bristles well developed, black, genae covered by dense white hairs. Frontal vitta almost parallel. $t_2$ with 2-4 ad. Wings hyaline, costal spine very small, $R_5$ open, pregonites bilobate; epiphallus absent. One Palaearctic and two Afrotropical species: *A. cuthbersoni* (Curran 1936) comb. nov. and *A. helvum* (Villeneuve 1916) comb. nov. Psammophilous species, hosts unknown.

### *Anacanthothecum testaceifrons* (von Roser, 1840)

Corresp. Bl. württ. landw. Ver. Stuttg. (N.S.) 17 (1): 57 *(Xysta).*
Pape 1987, Fauna ent. scand. 19: 36 *(Miltogramma).*

*pilitarsae* Rondani, 1859. Dipt. ital. Prodr. 3: 218 *(Miltogramma).*

#### Description

♂. Frons at vertex 0.25-0.31 and at antennal base 0.20-0.27 head width. Head yellowish gold dusted. Frontal vitta parallel, at fore orbitals 2-3 wider than parafrons, 1.0-1.3 times wider backwards. 3rd antennomere 1.4-2.0 times as long as second. Arista bare, inflated in basal half. 1st and 2nd antennomere and base of 3rd light brown to orange, rest of 3rd antennomere black, palpi elongate, yellow. Occiput and postgena blackish, grey dusted. Parafacial at level of antennal base about 0.18-0.22 and genae 0.07-0.09 eye height. One regular row of postorbitals; vte well developed, ocellar bristles elongate, fr 14-20, mid-sized. Parafrons with 1-2 plus 3-5 erect long orbitals and with some additional hairs on vertex (Fig. 27).

Thorax and legs black, slightly dark grey dusted, longitudinal stripes of mesonotum not distinct, narrow. ac 2-3+2, dc 2+4-5, ia 1+2-3, strong, h 2-3, npl 2, notopleura covered by numerous elongate black hairs, spl 1+2-3, propleuron bare. Scutellum with 5 pairs of strong marginals and 1-2 discals. Fore tarsus with 2 elongate bristles on apicodorsal surface of tarsomeres 1-4 (Fig. 32). $r_1$ bare, base of $r_{4+5}$ with 1-3 black hairs upwards and downwards, angle of m right, m-cu slight concave, 5th section of costa as long as 3rd section. Wings hyaline, basicosta and epaulet yellow.

Abdomen cinereous with chequered pattern and with blackish grey longitudinal medial stripe on tergites I-IV, tergites I+II without medial marginals, tergites III-V with row of marginal bristles, medial bristles often longer than others. Genitalia medium-sized (Fig. 39).

♀. Like ♂, but fore tarsus without long bristles or hairs.

Body length 6-15 mm.

**Distribution:** Europe except British Isles, ranging eastwards to East Siberia (Jakutia), Mongolia and India (Kashmir). Psammophilous species.

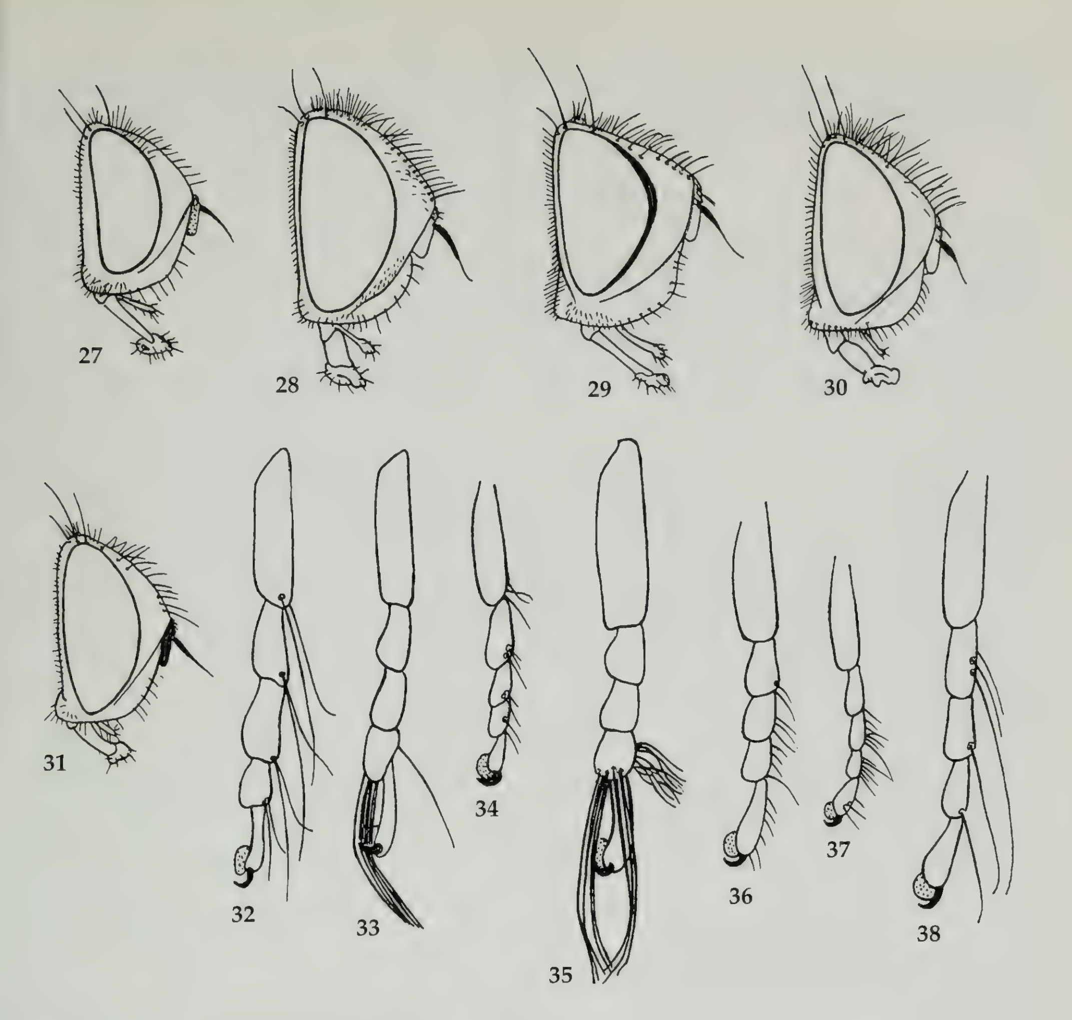



**Fig. 27.** *Anacanthothecum testaceifrons*. Male head, laterally.
**Fig. 28.** *Cylindrothecum ibericum*. Male head, laterally.
**Fig. 29.** *Miltogramma testaceum*. Male head, laterally.
**Fig. 30.** *Miltogramma murinum*. Male head, laterally.
**Fig. 31.** *Miltogrammatidium taeniatum*. Male head, laterally.
**Fig. 32.** *Acanthothecum testaceifrons*. Male fore tarsus.
**Fig. 33.** *Miltogramma oestraceum*. Male fore tarsus.
**Fig. 34.** *Miltogramma villeneuvei*. Male fore tarsus.
**Fig. 35.** *Miltogramma punctatum*. Male fore tarsus.
**Fig. 36.** *Miltogrammatidium rutilans*. Male fore tarsus.
**Fig. 37.** *Miltogramma brevipilum*. Male fore tarsus.
**Fig. 38.** *Miltogrammatidium taeniatum*. Male fore tarsus.

### Genus *Cylindrothecum* Rohdendorf, 1930

Fliegen palaearkt. Reg. 11, 64h, Lf. 39: 31.
**Type species:** *Cylindrothecum necopinatum* Rohdendorf, 1930 (syn. of *Miltogramma iberica* Villeneuve, 1912).

Dark, medium-sized flies with poorly defined black spots on hind borders of abdominal tergites. Frons, parafacials and gena very narrow, head profile rounded. Orbitals and frontals well developed,

parafacials bare, oral bristles numerous, gena and occiput with numerous short black hairs, $t_2$ with 2-4 ad, ♂ fore tarsus without specialized setae. $R_5$ open, costal spine very short. ♂ genitalia broad. Epiphallus absent, basiphallus rather elongate, ventral processes of paraphallus and dorsal plates also elongate, pregonites very long and thin, ventrally curved. One species.

### *Cylindrothecum ibericum* (Villeneuve, 1912)

Bull. Mus. natn. Hist. natur. Paris 508 *(Miltogramma).*
Pape, 1987, Fauna ent. scand. 19: 33 *(Miltogramma).*

*necopinatum* Rohdendorf, 1930. Fliegen palaearkt. Reg. 11, 64h, Lf. 39: 31 *(Cylindrothecum).*
*angustifrons* Townsend, 1932. Journ. N.Y. ent. Soc. 40: 444 *(Eumiltogramma).*
*takanoi* Kurahashi, 1970. Kontyu 38 (2): 100 *(Miltogramma).*

**Description**

♂. Frons at vertex 0.20-0.25 and at antennal base 0.24-0.30 head width. Head yellow to gold, vertex darker, frontal stripe yellow, without pollinosity, ocellar triangle black, postgena and occiput grey dusted. Frontal vitta almost parallel, at fore orbitals 2-3.5 times as broad as parafrons. 3rd antennomere 1.5-2.2 times as long as 2nd, arista wider at basal 0.5-0.8, bare. 1st, 2nd and base of 3rd antennomere brown to orange, terminal part of 3rd antennomere blackish. Palpi medium-length, yellow. Parafacials at antennal base 0.14-0.17 and gena 0.05-0.08 eye height. Two regular rows of postorbitals, vte strong and long, ocellar bristles numerous, elongate, hair-ike. Orbitals 3-5 proclinate, and one pair of reclinate bristles, fr 13-20, strong, parafrons with numerous black setae, parafacials practically bare, with yellow microscopic chaetae (Fig. 28).

Thorax and legs black with grey pollinosity, 3 broad black longitudinal stripes on mesonotum, medial stripe divided into 3 narrow lines before suture. Thorax with dense erect hairs. ac 2-3+3, only presutural pair strong, dc 2+4-5, ia 0-1+1-2, h 3-4, ph 2, npl 2, notopleura with numerous black hairs, spl 1+2-4. Propleuron bare. Scutellum with 4-5 pairs of erect marginals and 2-3 pairs of poorly defined discals. Fore tarsus without long hairs or bristles, $t_2$ with 2-3 ad. Wings hyaline, $r_1$ and $r_{4+5}$ bare, angle of m right, m-cu curved, 5th section of costa 1.2-1.5 times as long as 3rd. Basicosta yellow, epaulet black.

Abdomen with numerous black elongate hairs, marginals of tergites I+II and III often poorly defined, those on IV and V well developed. Abdomen yellow brown to blackish brown, yellowish grey dusted. Medial longitudinal black stripe well developed, posterior part of each tergite with lustrous black band. Genitalia black, weakly dusted (Fig. 40).

Body length 7-11 mm.

**Distribution:** Widely distributed throughout Palaearctic, Oriental and Australian (Solomon Islands) regions. Psammophilous, larvae are inquilines in nests of *Megachile* sp. (Baranov 1936), *M. kobensis* Cock., *M. nipponica* Cock., *M. tsurugensis* Cock. (Kurahashi 1973), *Anthophora* sp. (Pape 1987b).

### Genus *Miltogramma* Meigen, 1803

Magazin Insektenk. 2: 280.
**Type species:** *Miltogramma punctatum* Meigen, 1824:

**References:** Rohdendorf 1930, Fliegen palaearkt. Reg., 11, 64h, Lf. 39: 32-48; 1935 ibid., Lf. 88: 56-59; Séguy 1941, Encycl. ent. (A) 21: 265-267; Venturi 1960, Frust. ent. (7): 50-64; Pape 1987, Fauna ent. scand. 19: 27-38.

Medium- or small-sized flies, grey with yellow head. Frontal vitta broad, frons medium broad or narrow, gena narrow, parafacials moderately broad, head profile angulate. Vibrissal angle well above lower facial margin. Eyes large, bare. Arista bare, wider at basal 0.3-0.8. Parafacials bare or with microscopic hyaline setae. Middle tibia with 2-5 ad. Wings hyaline, $r_1$ bare, $r_{4+5}$ with some hairs at base. $R_5$ open, occasionally closed. Abdomen with chequered pattern, dense grey or yellowish grey dusted, in some species with black spots on tergites III-V. Epiphallus well developed, pregonites widened,

pointed. More than 50 species are widely distributed in the Palaearctic region. Flies are psammophilous or they favour mesophytic herbaceous habitats where they feed at flowers. Larvae are inquilines in nests of solitary bees, rare in sphecoid or vespoid wasps.

### Key to species of *Miltogramma*

1. Suprasquamal ridge setose. Abdominal pattern comprising 3 well defined black spots on each of tergites III-V. Fore tarsus of ♂ with numerous hair-like a and with a tuft of elongate strong p (Fig. 35) ........ *M. punctatum* Mg.
– Suprasquamal ridge bare. Abdomen with chequered pattern ........ 2.
2. Proboscis short, its length not more than 3-4 times its height ........ 3.
– Proboscis long, its length not less than 6-8 times its height ........ 4.
3. Fore tarsus of ♂ without specialised chaetae. Parafacials at antennal base not more than 0.22, gena not more than 0.09 eye height (Fig. 30). 3rd antennomere entirely yellow ........ *M. murinum* Mg.
– Fore tarsus of ♂ with 1-2 ad and a in apical part of each of tarsomeres 1-4 (Fig. 34). Parafacials at level of antennal base at least than 0.23 and genae at least than 0.12 eye height. 3rd antennomere partly fuscous to black ........ *M. villeneuvei* Verves
4. Frons at vertex not more than 0.33 head width. Parafrontals densely haired along their entire length. ♂ fore tarsus with several elongate pd on each of tarsomeres 3-5 (Fig. 37) ........ *M. brevipilum* Villn.
– Frons at vertex at least 0.38 head width. Parafrontals with long hairs at vertex, bare or with sparse short hairs on fore part ........ 5.
5. Abdomen with slight grey and not very distinct chequered pattern. 4th tarsomere of ♂ fore tarsus with single long ad and with tuft of thickened elongate pv projecting between claws (Fig. 33) ........ *M. oestraceum* (Fall.)
– Abdomen with distinct dark grey chequered pattern. Fore tarsus of ♂ without elongate chaetae ........ *M. germari* Meig.

### *Miltogramma brevipilum* Villeneuve, 1911

Dt. ent. Zt. 118.

**Description**

♂. Frons at vertex 0.29-0.33 and at antennal base 0.20-0.28 head width. Head yellowish white dusted, frontal vitta yellow, without pruinescence, at fore orbital bristles 1.5-2.2 times as broad as parafrons, and 1.3-2.0 times wider backwards. 3rd antennomere 2-3.5 times as long as 2nd, arista inflated at basal 0.5-0.7. 1st and 2nd antennomere light brown to orange, 3rd antennomere blackish or brownish grey, palpi short, apically widened, yellow; proboscis elongate its length 6-8 times its height. Parafacial at antennal base about 0.19-0.23 and gena 0.08-0.10 eye height. 2 rows of postorbitals, vte elongate and strong, ocellar bristles numerous, hair-like. or 1+3-5, fr fine, elongate, 15-25 pairs, parafrontal densely haired along their entire length, parafacil bare or with several black hairs in upper part, oral bristles moderately long, black, gena covered by erect and dense yellow hairs, occiput with black hairs, grey dusted.

Thorax and legs black, light grey or yellowish grey pollinose, longitudinal stripes of mesonotum narrow, poorly defined. ac 0+1-2, dc 2+3-4, ia 0+1-2, h 2-3, ph 1, npl 2, notopleura densely haired, spl 1+3-4. Propleuron bare. Scutellum with 4-5 pairs of marginals and with 2-3 pairs of discals. Fore tarsus (Fig. 37) with 2-5 elongate hair-like pd on each of tarsomeres 3-5. $t_2$ with 2-3 ad. m-cu curved, 5th section of costa 1.1-1.4 times as long as 3rd section. Wings hyaline, basicosta yellow, epaulet yellowish brown or brown.

Abdomen with cinereous chequered pattern. Tergites I+II without marginals, tergite III with pair

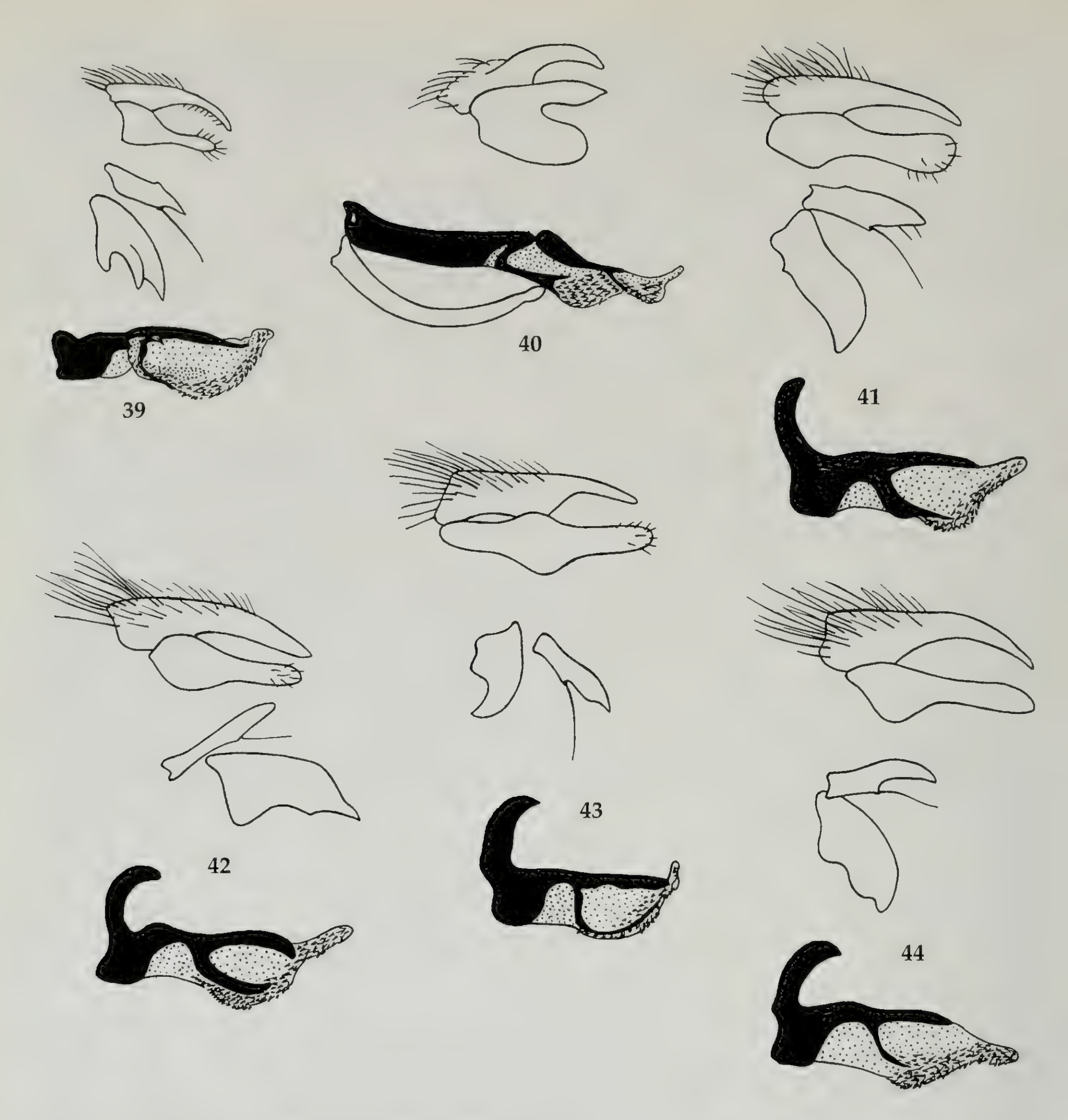



**Fig. 39.** *Anacanthothecum testaceifrons*. Male genitalia, laterally.
**Fig. 40.** *Cylindrothecum ibericum*. Male genitalia, laterally.
**Fig. 41.** *Miltogramma germari*. Male genitalia, laterally.
**Fig. 42.** *Miltogramma oestraceum*. Male genitalia, laterally.
**Fig. 43.** *Miltogramma villeneuvei*. Male genitalia, laterally.
**Fig. 44.** *Miltogramma punctatum*. Male genitalia, laterally.

of medial marginal bristles, tergites IV and V with row of marginals. Genitalia small. Surstyli with hump at base (Fig. 46).

♀. Like ♂, but long pd at fore tarsus absent.

Body length 5.5-9.0 mm.

**Distribution:** A psamophilic species widely distributed in southern and central Europe, in Palestine, Central Asia and southern Siberia. Larvae in nests of solitary bees *Anthridium* sp. (Verves 1984a).

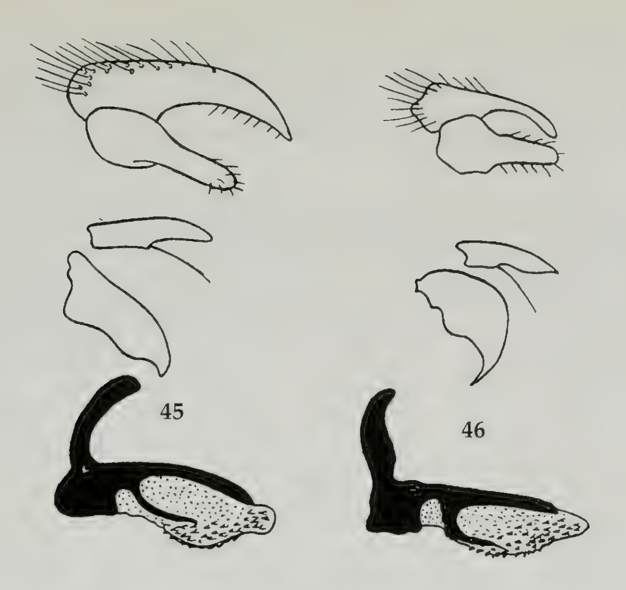



**Fig. 45.** *Miltogramma murinum.* Male genitalia, laterally.
**Fig. 46.** *Miltogramma brevipilum.* Male genitalia, laterally.

### *Miltogramma germari* Meigen, 1824

Syst. Beschr. 4: 229.

**Description**

♂. Frons at vertex 0.38-0.43 and at antennal base 0.32-0.38 head width. Head yellow or golden dusted, frontal vitta almost parallel, at fore orbital bristles 1.5-2 times as broad as parafacial, yellow, finely dusted. 3rd antennomere 1.5-2 times as broad as 2nd. Arista inflated at basal 0.5-0.8. 1st, 2nd and 3rd antennomere orange to yellowish brown, distal part of 3rd antennomere fuscous. Palpus at apex inflated, yellow, proboscis elongate. Parafacial at antennal base equals 0.22-0.26 and gena 0.13-0.16 eye height. 2 rows of postorbital setae. vte long and strong, ocellars numerous, hair-like, or 1+3-5, strong, fr strong, 20-30 pairs irregularly spaced on upper part. Parafrontal with numerous erect black hairs at vertex, only few short setae on lower part. Parafacial practically bare, covered by microscopic hyaline chaetae. Vibrissal bristles numerous, strong, black. Fore part of gena yellow haired, postgena and occiput covered by black setae.

Thorax and legs black with dark grey pollinosity, bands on mesonotum poorly deloped. ac 2-3+3-4, only prescutellar pair strong, dc 2-4, ia 1+1-2, h 2-3, ph 2, npl 2, notopleura with several fine setae, spl 1+3, propleuron bare. Scutellum with 3 marginals and 2-3 discals. Fore tarsus of ♂ without specialised hairs or bristles. m-cu curved. Ratio of 3rd and 5th costal sections 1:1.2-1.6.

Abdomen with brownish grey pollinosity and with dark chequered pattern. Abdominal tergites in basal half yellowish brown. One pair of medial marginals present on tergites I+II (usually poorly defined) and III-V each with a row of marginals. Genitalia dark, light dusted (Fig. 41).

**Distribution:** The species is widely distributed in Europe, North Africa (Algeria, Morocco), southern Siberia and Mongolia. The flies frequent mesophytic habitats with bushes, feeding at flowers of Asteraceae, Euphorbiaceae etc. Larvae are inquilines in bee nests: *Heliophila bimaculata* Pz. (Séguy 1941a), *Anthophora* sp., *Megachile* sp. (Pape 1987b).

### *Miltogramma murinum* Meigen, 1824

Syst. Beschr. 4: 230.

*ruficornis* Meigen, 1824. Syst. Beschr., 4: 231.

**Description**

♂. Frons at vertex 0.31-0.36 and at antennal base 0.24-0.28 head width. Head yellow to golden dusted, frontal vitta yellow, finely dusted, at fore orbital bristles 2.5-5.3 times as wide as parafrontal, 1.1-1.5 times widened backwards. 3rd antennomere 1.5-2.0 times as long as 2nd, arista inflated at basal 0.4-0.5, antenna and palpus completely yellow, arista dark brown. Proboscis short, not more than 3-4 times as long as its height. Parafacial at antennal base equal 0.17-0.22 and gena 0.06-0.09 eye height. 2 rows of postorbitals, vte long and strong, ocellars numerous, erect, hair-like. or 1-2+2, strong, fr 12-18, long and strong in fore frontal part, whereas they are thin and hair-like in hind frontal part. Parafrontal at vertex with several long erect black hairs, fore part of parafrontal with short black hairs or bare, parafacial practically bare, with microscopic hyaline setae. Fore part of gena with short yellow or white setae, postgena and occiput with numerous black hairs, light grey dusted (Fig. 30).

Thorax and legs black, grey dusted; mesonotum light or dark grey with more or less developed black longitudinal stripes. ac 2-3+2-3, only prescutellar pair strong, dc 3+3-4, ia 0-1+1-2, h 2-3, ph 1, npl 2, notopleura with numerous erect black hairs, spl 1+1, sternopleura with numerous additional bristles between fore and hind longest bristles, proleuron bare. Fore tarsus of ♂ without specialized chaetae, $t_2$ with 1 long and 1-3 short ad at middle. Scutellum with 3 pairs of marginals and with several discals, m-cu curved, ratio between 3rd and 5th sections of costa 1 : 1.2-1.6. Wings hyaline, basicosta yellow, epaulet black to brown.

Abdomen with light or dark grey chequering, often with medial lontitudinal narrow stripe on tergites I+II-IV, ♂ genitalia (Fig. 45) black, light dusted. Tergites I+II without marginals, tergites III-V with row of marginal bristles, medial marginals of tergite III erect or poorly visible.

Body length 4.5-8.5 mm.

**Distribution:** Southern and central Europe, Transcaucasia, North Africa, Palestine, Turkey and Cyprus. A xerophilous and psammophilous species, larvae develop in nests of bees: *Trachusa bussina* Pz., *Megachile circumcincta* Kirby (Kramer 1917), *M. pacifica* Pz. (Tasei 1975, Dochkova 1982), *Osmia aurulenta* Pz., *Hoplitis tridentata* Duff. & Perris (Séguy 1941a).

### *Miltogramma oestraceum* (Fallén, 1820)

Monogr. Musc. Sveciae 17 *(Tachina)*.

**Description**

♂. Frons at vertex 0.39-0.43 and of antennal base 0.30-0.35 head width. Head yellow pollinose, frontal vitta almost parallel, at fore orbitals 3-4 times as broad as parafrontal, ocellar triangle blackish. 3rd antennomere 1.8-2.7 times as long as 2nd, arista inflated at basal 0.4-0.6. 1st and 2nd antennomeres light brown to orange, 3rd antennomere grey to brownish grey, palpus yellow, proboscis elongate. Parafacials at antennal base equal 0.22-0.26 and gena 0.14-0.17 eye height. One row of regular postorbital setae. vte long and strong, ocellars numerous, hair-like. or 1+3-5, strong. fr 12-17, strong, irregularly spaced in upper part. Parafrontal with several long recurved hairs at vertex and short black setae on lower part, which are often absent. Parafacials practically bare with microscopic hyaline setae. Oral bristles moderately short, numerous and black. Gena with numerous white or yellow setae, without black hairs, occiput light grey dusted, white haired.

Thorax and legs light grey pollinose, mesonotum slightly yellowish dusted, longitudinal stripes not well defined, ac 2+3-2+3, dc 2-3+4, ia 1-1+2, h 3, ph 1, npl 2, notopleura with several (5-10) erect hairs, spl 1+1. Propleuron bare. Scutellum with 3-5 marginals and 1-3 discals. ♂ fore tarsus with asymmetrical 4th tarsomere (Fig. 33), with long ad bristle and with tuft of elongate flattened v, which project between claws. m-cu curved, ratio between 3rd and 5th costa sections 1 : 1.1-1.4. Wings hyaline, basicosta and epaulet yellow.

Abdomen with light yellowish chequered pattern, genitalia medium-sized and grey dusted (Fig. 42). Tergites I+II and III with or without medial marginals, tergites IV and V each with row of marginals.

♀. Essentially similar to ♂. Fore tarsus without specialized setae.

Body length 6.5-10.0 mm.

**Distribution:** Europe except British Isles, ranging to southern Siberia, Mongolia, North Africa, Palestine, Lebanon and Central Asia. Flies frequent mesophytic herbaceous strata in bushy habitats, feeding on flowers of Asteraceae, Lamiaceae, Apiaceae, Euphorbiaceae etc. Larvae are inquilines in nests of sphecoid wasps *Cerceris* spp., *Podalirius* spp. (Pape 1987) and bees – *Dasypoda plumipes* Pz., *Anthophora acervorum* L, (Baer 1921), *Megachile pacifica* Pz. (Sierra & Ibanez 1972).

## *Miltogramma punctatum* Meigen, 1824

Syst. Beschr. 4: 228.

### Description

♂. Frons at vertex 0.33-0.35 and at antennal base 0.26-0.30 head width. Parafrontals, lunula and parafacials light golden or yelow pollinose, frontal vitta yellow, golden dusted, 1.5-1.8 wider posteriorly, at anterior orbitals 2-3 times as broad as one parafrontal. 3rd antennomere 1.5-2.0 times as long as 2nd, arista inflated in basal 0.4-0.5. Antenna black, apical margin of 2nd antennomere brown to yellow, arista black, palpi yellow, proboscis elongate. Parafacials at antennal base equal to 0.18-0.26 and gena 0.11-0.15 eye height. Postorbitals in one regular row. vte elongate, strong; ocellars hair-like, or 1+4-6, fr 15-25, strong, in hind part hair-like, parafrontal with long reclinate hairs at vertex, and with fine black setae in fore part, parafacial bare. Gena and occiput with numerous short xellow hairs, occiput light grey pollinose.

Thorax and legs black, with grey pollinosity, metacephalon yellowish grey pollinose, longitudinal stripes not clear. Suprasquamal ridge with row of hairs. ac 2-3+2-4, dc 2-4+4-5, ia 1+2-3, h 2-4, ph 1, npl 2, notopleura with 6-13 black hairs, spl 1+1-2, propleuron bare. Scutellum with 3 pairs of strong marginals and 2-3 pairs of fine discals. 4th tarsomere of fore tarsus with long, dense hair-like a and 5-6 elongate strong curved p (Fig. 35). Vein m-cu slightly curved, almost straight. Ratio between 3rd and 5th costal sections equals 1 : 0.8-1.2. Wings hyaline, basicosta yellow, epaulet yellow or brownish.

Abdomen with light grey or yellowish grey chequered pattern, with 3 black spots in hind part on each of tergites III-V. Genitalia small, densely grey dusted (Fig. 44). Tergites I+II and III without medial marginals.

♀. Frons narrower than in ♂ (0.32-0.34 head width), fore tarsus without specialized chaetae.

Body length 5.0-10.5 mm.

**Distribution:** Widely distributed in the Palaearctic region from the British Isles to Japan, North to South Africa and the Canary Islands, and from Iran to North China. A characteristic psammophilous species the adult flies of which feed at flowers of Asteraceae. Larvae are inquilines in nests of various solitary bees: *Colletes davesianus* Sm., *C. fodiens* Latr., *C. succinotus* L. (Baer 1921), *C. inexpectatus* Nock (Draber-Monko 1969), *Halictus sexnotatus* Nyl. (Tiensuu 1939) and sphecoid wasps: *Bembex* sp. (Charykuliev, Myartzeva, 1964), *B. rostrata* L. (Baer 1921), *Tracheliodes* sp. (Pape 1987b), *Ammophila hirsuta* Scop. (Baer 1921).

## *Miltogramma villeneuvei* Verves, 1982

Ent. Obozr. 61 (1): 189, nomen novum pro *M. meigeni* Vill.

*meigeni* Villeneuve, 1922. Ann. Sci. nat., Zool. 10 (5): 342 *(Miltogramma)* (nom. preocc. by Robineau-Desvoidy 1863).

*murinum* Rohdendorf, 1935. Fliegen palaearkt. Reg. 11, 64h, Lf. 88: 57, *(Miltogramma)* (misidentification, not Meigen 1824).

*ussuriensis* Artamonov & Verves, 1987. Taxonomy of insects of Siberia and Far East of USSR, Vladivostok 126 *(Miltogramma)*.

**Description**

♂. Frons at vertex 0.35-0.39 and at antennal base 0.30-0.34 head width. Head golden yellow dusted, frontal vitta brownish yellow, fine dusted, perallel-sided, 3-3.5 times as wide as parafrontal, 3rd antennomere 1.5-2.2 times as long as 2nd, arista thickened in basal 0.3-0.5. 1st, 2nd and basal part of 3rd antennomeres orange to brown. 3rd antennomere mostly fuscous to black, in ♀ often completely deep yellow, palpus yellow, proboscis short. One regular row of postorbitals. vte strong, ocellars hair-like, orbitals 1-2+3-5, strong, frontals 17-30, on fore part strong, hair-like, on hind part irregular. Parafrontal with some elongate hairs at vertex, and with fine short black hairs on anterior part; parafacial practically bare, oral bristles comparatively long and numerous; gena yellowish white haired, postgena and occiput black setose.

Thorax and legs black, light grey dusted, mesonotum with poorly defined longitudinal stripes and yellowish grey dusted ac 2-3+2-3, dc 2-3+4-5, ia 1+2-3, h 3, ph 2, npl 2, notopleura with numerous erect black hairs, spl 1+1-2, propleuron bare. Scutellum with 3-4 pairs of strong marginals and several poorly defined discals. Fore tarsus (Fig. 34) with 1-2 long hairs in apical part (ad and a) of 1st-4th tarsomere. with $t_2$ 1-2 long and 2-3 short ad near its middle. m-cu not curved, ratio between 3rd and 5th costal section 1 : 1.1-1.3. Wings hyaline; basicosta yellow, epaulet fuscous to black.

Abdomen light grey or yellowish grey, dusted with chequered pattern, often with dark longitudinal stripe, ♂ genitalia small, grey dusted (Fig. 43). Tergites I+II and III with or without medial marginals.

Body length 7.0-9.5 mm.

**Distribution:** Europe to southern Siberia and Far East, North Africa. Flies feed at flowers in mesophytic herbaceous habitats with bushes. Larval habits are unknown.

### Genus *Miltogrammatidium* Rohdendorf, 1930

Fliegen palearkt. Reg. 11, 64 h, Lf. 39: 33.
**Type species:** *Miltogramma taeniatum* Meigen, 1824.

Medium-sized to small grey flies with yellow or silvery dusted head and with distinct spots or bands on abdomen. Frontal vitta broader than one parafrontal; frons, parafacial and gena very narrow, head profile rounded. Vibrissal angle well above lower facial margin. Eyes large, bare. Arista bare, inflated at basal 0.4-0.8. Parafacial bare. Mid tibia with 2-4, rarely with 1 ad. Wings hyaline, $r_1$ bare, $r_{4+5}$ bare or with few setae at base, $R_5$ open. Propleuron bare, proboscis short (not more than 3-4 times as long as its height). Epiphallus well developed, pregonites pointed at apex.

Some 35 species occur in the southern Palaearctics, Palaeotropics and Australia and are thoroughly psammophilous. Larvae are inquilines in nests of solitary bees and sphecoid wasps.

### Key to species of *Miltogrammatidium*

1. Antenna entirely black. Fore tarsus of ♂ with elongate paired d at 2nd-4th tarsomere (Fig. 38). Abdominal tergites each with black dorsal band in hind ⅕th ............................ *M. taeniatum* (Mg.)
– Antenna yellow to orange, arista brownish black. Fore tarsus of ♂ with numerous short setae on dorsal surface of 3nd and 4th tarsomeres (Fig. 36). Abdominal tergites each with medial black spot posteriorly and with pair of lateral bands or stripes ................................................ *M. rutilans* (Mg.)

### *Miltogrammatidium rutilans* (Meigen, 1824)

Syst. Beschr. 4: 231 *(Miltogramma)*.

**Description**

♂. Frons at vertex 0.24-0.26 and at antennal base 0.20-0.26 head width. Head yellow dusted, frontal vitta dark yellow, with fine pruinescence in hind part, 1.5-2.0 times as broad as parafrontal, 1.1-2.0 times wider posteriorly. Ocellar triangle brown, white dusted. 3rd antennomere 1.4-1.7 times as long

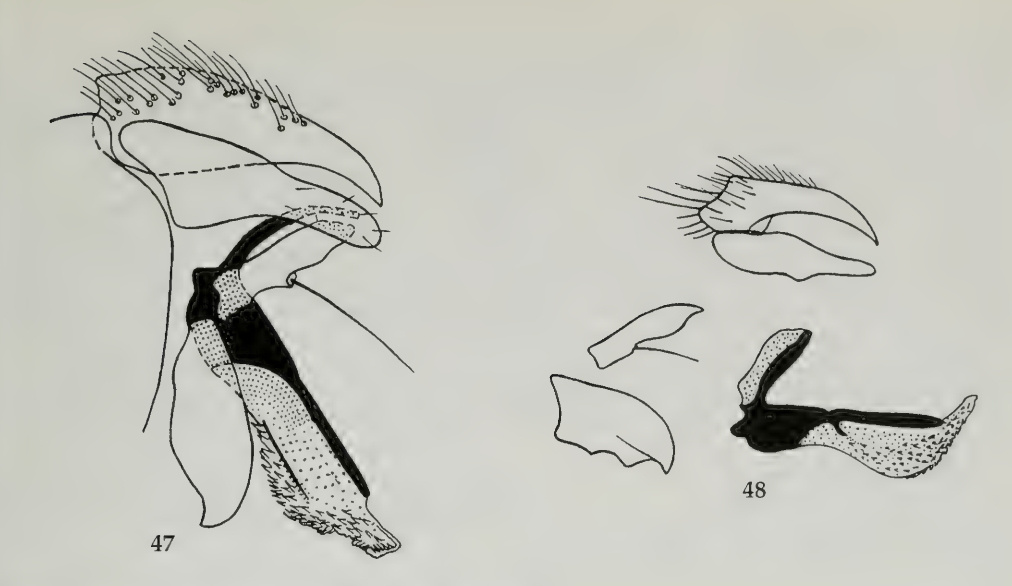



**Fig. 47.** *Miltogrammatidium taeniatum.* Male genitalia, laterally.
**Fig. 48.** *Miltogrammatidium rutilans.* Male genitalia, laterally.

as 2nd, arista inflated in basal 0.4-0.6. Antenna yellow to orange, arista brown to black, base reddish. Palpus widened apically, yellow. Parafacial at antennal base equal 0.15-0.17 and gena 0.08-0.11 eye height. One row of postorbitals, vte strong, ocellars numerous, hair-like. or 1+1-2, medium-sized, fr 14-18, comparatively strong. Parafrontal bare or with 2-4 short black setae at vertex. Oral bristles numerous, black, not very strong, gena short yellow haired, occiput light grey dusted with numerous black setae.

Thorax and legs black, densely pale grey or yellowish grey dusted. Longitudinal stripes on mesonotum poorly defined, linear. ac 0+1, dc 2+4-5, only prescutellar pair strong, other bristles short, hair-like, ia 0+1, h 2-3, ph 1, npl 2. Notopleura with numerous (6-13) black hairs. spl 1-2+1, fore bristles shorter, hair-like. Scutellum with 2-3 pairs of marginals (basal bristles between often short and fine), discals poorly developed. Fore tarsus in ♂ (Fig. 36) with short erect hairs on dorsal surface of 3rd and 4th tarsomeres. $t_2$ with 1-2 ad. Vein m-cu moderately curved, ratio between length of 3rd and 5th costal sections about 1 : 0.9-1.2. Basicosta yellow, epaulet yellow to yellowish brown.

Abdominal tergites I+II and III without medial marginals, IV and V with row of marginal bristles. Genitalia small, light grey dusted, ♂ cerci and surstyli black or brownish black (Fig. 48). Abdomen light grey dusted, with black pattern. Tergites III and IV each with black rounded central spot and with pair of lateral bands at distal 0.3-0.4; distance between this spot and bands more than diameter of central spot, tergite V with similar pattern, but the bands and spots are connected.

Body length 4.5-8.5 mm.

**Distribution:** A psammophilous species, widely distributed in southern and central Europe, western Siberia, Transcaucasia, Central Asia and Turkey. Bionomics unknown.

### *Miltogrammatidium taeniatum* (Meigen, 1824).

Syst. Beschr. 4: 228 *(Miltogramma).*

#### Description

♂. Frons at vertex 0.23-0.29 and at antennal base 0.20-0.25 head width. Head golden or yellowish pollinose. Frontal vitta yellow, fine dusted, at fore orbitals 1.2-1.7 times as broad as parafrontal, widening 1.4-2.0 times backwards. 3rd antennomere 1.7-2.5 times as long as 2nd, arista inflated in basal

0.4-0.5. Antenna black, apical part of 2nd antennomere brownish to yellowish red, palpus yellow, proboscis short. One row of postorbitals. vte elongate, ocellars hair-like, or 1-2+2-4, strong, fr 12-18, elongate in fore part, hair-like in hind part. Parafrontal at vertex with several erect black hairs, fore part bare. Oral bristles short, black. Gena with numerous erect short yellow or white hairs, occiput light grey pollinose, with black setae (Fig. 31).

Thorax and legs black, grey dusted, mesonotum with well defined broad longitudinal black stripes. Medial (central) stripe in fore part divided into three narrower bands. ac 1+1-2, only prescutellar pair being strong. dc 2-3+4, only last pair being elongate and well developed, ia 2-3+4-5, h 3-4, ph 1-2, npl 2, notopleura with numerous erect black hairs, spl 1+2-3, strong. Fore tarsus (Fig. 38) with elongate paired d on tarsomeres 2-4, t with 1 ad; m-cu moderately curved, ratio between length of 3rd and 5th costal sections 1 : 1.3-1.6. Scutellum with 4-5 pairs of marginals and several not distinct discals. Basicosta yellow, epaulet black.

Abdomen with dark grey chequering, hind margins of tergites more or less lustrous black, tergites III and IV each with dark longitudinal medial stripe. Genitalia small, densely yellowish grey dusted (Fig. 47). Tergites I+II without marginals, tergite III with medial marginal bristles more or less developed, sometimes absent.

Body length 6.0-9.5 mm.

**Distribution:** Widely distributed in south-western Palaearctic and Oriental regions. Flies prefer sandy areas on river banks. Larval bionomics unknown.

## Subtribe Apodacrina Rohdendorf, 1967

Trudy Paleontol. Inst. Akad. Nauk SSSR 116: 64.

Bright flies, small to medium-sized (3-10 mm). Eyes large, frons and parafacials broad, gena narrow, 3rd antennal segment elongate, vibrissal angles disposed at oral margin. $R_5$ petiolate, abdomen with black spots or bands. About 50 species representing 3 genera are distributed in southern parts of the Palaearctic region and the Palaeotropics. Larvae are inquilines in nests of sphecoid wasps. Flies are extremely xerophilous and psammophilous.

## Genus *Apodacra* Macquart, 1854

Annls. Soc. ent. Fance (3) 2: 425.
**Type species:** *Apodacra seriemaculata* Macquart, 1854.

**References:** Rohdendorf 1930: Fliegen palaearkt. Reg. 11, 64 h, Lief, 39: 18-21; Séguy 1941: Encycl. ent. (A) 21: 251-257; Venturi 1960: Frust. ent. 2 (7): 34-38.

Brightly coloured flies of small size (3-6 mm). Frontal vitta broad, arista inflated in basal 0.5-0.9. or 0-1+3-6, strong, parafacials bare, middle legs in ♂ without ctenidium, $r_1$ bare. Epiphallus well developed. About 20 species are distributed in the Palaearctic, Afrotropical and Oriental regions.

### *Apodacra pulchra* Egger, 1861

Verh. zool. bot. Ges. Wien 11: 216.

#### Description

♂. Frons at vertex 0.41-0.43 and of antennal base 0.35-0.38 head width. Head silvery white dusted. Frontal vitta bright yellow, its fore part without pollinosity, at fore orbitals as broad as parafrontal, 2.0-2.5 times wider backwards. 3rd antennomere 3.5-5.5 times as long as 2nd. Arista inflated in basal 0.7-0.9. 1st, 2nd and basis of 3rd antennomeres yellow, greatest part of 3rd antennomere and arista greyish brown. Palpi short, widening towards apex, yellow. Proboscis elongate. Parafacials at antennal base 0.17-0.21 and genae 0.06-0.13 eye height. One regular row of postorbitals. vte well developed, ocellars strong. or 1+3-5, fr 8-11, parafrontals bare. Angular vibrissae long and strong, oral bristles

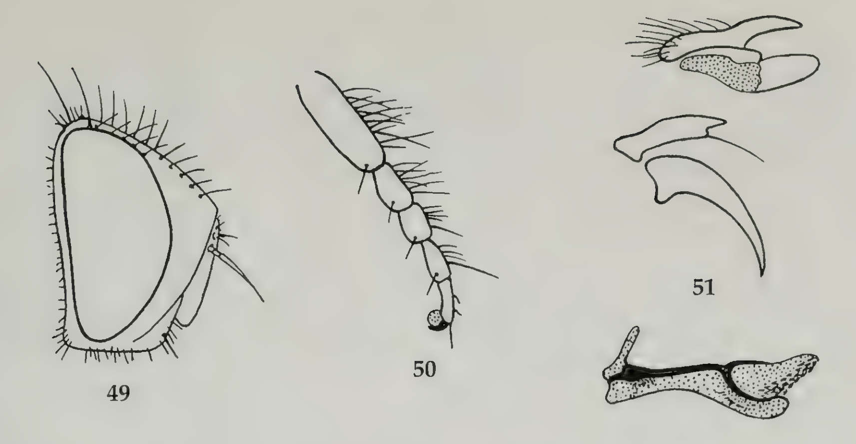



**Fig. 49.** *Apodacra pulchra*. Male head, profile.
**Fig. 50.** *Apodacra pulchra*. Male fore tarsus, anterior view.
**Fig. 51.** *Apodacra pulchra*. Male genitalia, laterally.

numerous, black. Gena and occiput with numerous short yellow hairs, occiput and postgenae light grey dusted (Fig. 49).

Thorax densely light grey dusted, mesonotum without dark lines, scutellum at apex brownish or reddish. ac 2-4+4-5, only prescutellar pair being distinct, dc 3-4+4-5, only two hind pairs strong. ia 1+3, h 2-3, ph 1, npl 2, notopleura without hairs, spl 1+1, propleuron bare. Scutellum with 3-4 strong marginals and several discals. Fore tarsus of ♂ with numerous erect hairs on dorsal surface of 1st-4th tarsomeres (Fig. 50). $t_2$ with 1 long and 2-3 short ad. Legs black, grey dusted, knees of all legs yellow. Costal spine absent, $r_{4+5}$ with 1-2 hairs at base of both surfaces, m-cu moderately curved. Angle of m-vein acute. Ratio between 3rd and 5th costal sections 1 : 2.0-2.5. Wings hyaline, basicosta and epaulet yellow.

Abdomen grey dusted with black pattern. Tergites I+II with indistinct spots. Tergites III and IV caudally (at about ⅓ to ¼) each with rounded medial spot and with pair of lateral bands. Distance between elements of pattern greater than diameter of medial spot. Tergite V with similar pattern on caudal 0.5-0.6. ♂ genitalia medium sized, densely grey dusted (Fig. 51), tergites I+II and III without marginals, tergite IV with pair of erect marginals, tergite V with row of marginal bristles.

Body length 4-6 mm.

**Distribution:** Widely distributed in central and southern Europe, central Asia, and Palestine. Flies prefer sandy areas, especially on river banks. Larval host is unknown.

## Tribe Amobiini Townsend, 1918

Townsend 1918, Insecutor Inscit. menstr. 5: 157.

This tribe is easily defined by such autapomorphic characters as narrow frons, presence of numerous (more than 6) hair-like proclinate orbital bristles, absence of epiphallus, exceptionally well developed medial processes of paraphallus, short and widened aedeagus, shortened acrophallus and, in first instar larva, the large hypophyryngeal sclerite. This tribe includes two genera, viz. the cosmopolitan *Amobia* R.-D. and the Australian monobasic *Australometopia* Malloch, comprising in all about 20 species. The flies prefer intrazonal bushwood associations. Females show preference for larviposition in certain types of host-nests, e.g. "cleyey pipkins" or nests built in the pith of stems. It is known that the host species (various eumenid and sphecoid wasps, solitary bees) or the size of their prey is indifferent for the inquilinous Amobiini.

## Genus *Amobia* Robineau-Desvoidy, 1830

Essai Myod. 96.
**Type species:** *Amobia conica* Robineau-Desvoidy, 1830 (syn. of *Tachina signata* Meigen, 1824).

*Pachyophthalmus* Brauer & Bergenstamm, 1889. Denkschr. Akad. Wiss. Wien 56: 117.
**Type species:** *Tachina signata* Meigen, 1824.

*Senotainiella* Zumpt, 1952. Proc. R. ent. Soc. Lond. (B) 21: 13.
**Type species:** *Senotainiella decolor* Zumpt, 1952 (syn. of *Sphixapata pelopei* Rondani, 1859).

**References:** Allen 1926, Proc. U. S. Nat. Mus. 68 (9): 7-16; Rohdendorf 1935, Fliegen palaearkt. Reg. 11 (64h), Lf. 88: 92-95; Richards 1935, Stylops 4 (9): 209-213; Venturi 1960, Frust. ent. 2 (7) f: 71-74; Zumpt 1961, Explor. Parc Nat. Albert 98: 62-65; Draber-Moňko 1966: Polská. pis. ent. 36 (7): 395-405; Kurahashi 1974, Pacif. Ins. 16 (1): 57-60; Pape 1987, Fauna ent. scand 19: 45-49.

Dark grey, medium-sized or small flies (3.5-9.5 mm). Head with rounded profile (Fig. 52), frons, facials and gena narrow, antennal insertion below centre of eye. 3rd antennomere about 1.5-2 times length of 2nd, arista elongate, bare, eyes bare. Orbitals numerous, hair-like, frontals strong, parafrons with numerous microscopic chaetae, parafacials with similar setae or bare, angular vibrissae elongate, strong. Head grey or yellowish grey dusted, antennae and palpi black. Propleuron bare; ac 2-3 (rarely 0) +3, dc 0-2-3+3-4. Wings hyaline, $R_5$ open, $r_1$ bare, $r_{4+5}$ with several setae at base, ratio between 3rd and 5th sections of costa 1 : 1.4-2.6, m-cu curved. ♂ tarsus without long bristles or hairs. Claws and pulvilli in ♂ as long or longer than 5th tarsomere. Thorax and legs grey, longitudinal stripes on mesonotum more or less developed. Genitalia black. About 20 species are distributed in various zoogeographical regions. Three palaearctic species.

### Key of species of *Amobia*

1. ♂ .......... 2.
– ♀ .......... 4.

2. Pregonites long and sigmoid curved, aedeagus not enlarged (Fig. 53) .......... *A. oculata* (Zett.)
– Pregonites short, hook-like .......... 3.

3. Aedeagus elongate, narrow at tip (Fig. 54) .......... *A. pelopei* (Rd.)
– Aedeagus widened apically (Fig. 55) .......... *A. signata* (Meig.)

4. Tergite VIII of ovipositor complete; tergite VII with marginals and discals (Fig. 56) .......... *A. oculata* (Zett.)
– Tergite VIII bilobate; tergite VII without discals (Fig. 57) .......... 5.

5. Tergite X with some setae present, sternite VIII with apical hairs only (Figs 57, 58), dc 2+3-4 .......... *A. signata* (Mg.)
– Tergite X without setae, VIII haired on greater part of surface (Fig. 59), dc 0+1 .......... *A. pelopei* (Rd.)

### *Amobia oculata* (Zetterstedt, 1844)

Dipt. Scand. 3: 121 *(Miltogramma)*.

*Pachyophthalmus distortus* Allen, 1926. Proc. U. S. natn. Mus. 68: 15.
*Pachyophthalmus dyki* (Jacentkovský 1939). Sbor. ent. odd. Nár. mus. v Praze 17: 158.

**Description**

♂. Frons at vertex 0.25-0.30 and at antennal base 0.20-0.26 head width. Parafrontals and parafacials grey dusted, frontal vitta parallel, black, fore part slightly pale pollinose. 3rd antennomere about

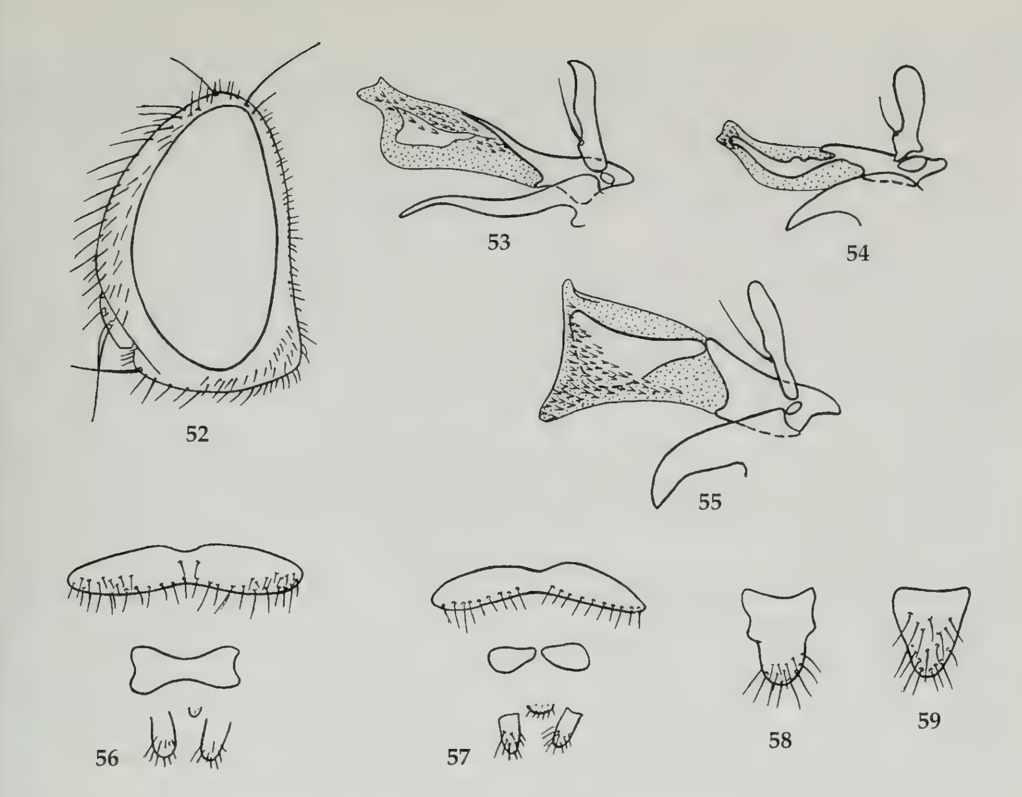



**Fig. 52.** *Amobia signata.* Male head, laterally.
**Fig. 53.** *Amobia oculata.* Aedeagus and gonites, lateraly.
**Fig. 54.** *Amobia pelopei.* Aedeagus and gonites, laterally.
**Fig. 55.** *Amobia signata.* Aedeagus and gonites, laterally.
**Fig. 56.** *Amobia oculata.* VIII-X female tergites and cerci, dorsally.
**Fig. 57.** *Amobia signata*, VIII-X female tergites and cerci, dorsally.
**Fig. 58.** *Amobia signata.* VIII sternite of female abdomen, ventrally.
**Fig. 59.** *Amobia pelopei.* VIII sternite of female abdomen, ventrally.

1.1-1.5 times length of 2nd, arista bare, proximal ⅓-¼ inflated. Antenna and palpi black. Parafacial at antennal base 0.18-0.23 and genae 0.11-0.14 eye height. Ocellars elongate, rarely bare. Gena and occiput grey with black hairs.

Thorax and legs black, grey pollinose, mesonotum with 3 dark brown longitudinal stripes. ac 2-3+1-3, dc 2+3-4, ia 1+3, h 3-4, ph 1-2, npl 2 long and 2-5 short, spl 1+1, propleuron bare. Scutellum with 3 pairs of strong marginals and several hair-like discals. $t_2$ with one ad. Wing hyaline, basicosta brown to blackish brown, costal spine absent. Abdomen grey dusted, with 3 longitudinal spots on each tergite, those on tergite V sometimes reduced, genitalia medium-sized, black. Tergites I+II and III with 1-2 pairs of erect medio-marginal bristles, tergites IV and V each with row of marginals. Pregonites long and slender, distiphallus not strikingly enlarged (Fig. 53).

♀. Generally like ♂, abdominal spots on tergites III and IV tend to fuse at posterior margin. Two oval and one spherical spermatheca. Genitalia see Fig. 56.

Body length 5.0-9.0 mm.

**Ecology:** Recorded from nests of Eumenidae: *Ancistrocerus catskilli* (Sauss.) (Krombein 1967, Myers 1987), *Antherhyncium flavomarginatum micado* Kirsch, *Eumenes decoratus* Smith, *E. rubrofemoratus* Tosava (Kurahashi 1973), *Odynerus crassicornis* (Pz.) (Draber-Moňko 1966), *Orancistrocerus drewseni* Sauss. (Itimo 1986), *Rhynchium haemorrhoidale fukaii* Cameron, *Stenodynerus frauenfeldi* Sauss., *Symmorphus*

*captivus* Smith (Kurahashi 1973), *S. cristatus* (Sauss.) (Krombein 1967), and Sphecidae: *Ectemnius stirpicola* (Pack.) (Krombein 1960), *Trypargilum clavatum* (Say) (Krombein, 1967), *Trypoxylon frigidulum* Smith (Krombein 1967), *T. obsonator* Smith (Kurahashi 1973), *T. politum* Say (Allen 1926), *T. regium* Guss. (unpublished data of Dr. Antropov, Moscow University), *T. striatulum* (Prov.) (Krombein 1967).

Flies prefer various mesophytic habitats meadows, bushes etc.

**Distribution:** A Holarctic species.

### *Amobia pelopei* (Rondani, 1859)

Dipt. ital. prodr. 3: 228 *(Sphixapata).*

*decolor* Zumpt, 1952. Proc. R. ent. Soc. Lond. (B) 21: 4 *(Senotainiella).*

**Description**

♂. Frons at vertex 0.20-0.25 and at antennal base 0.18-0.23 head width. Parafrontal, parafacial and lunula silvery grey or yellow grey dusted, frontal vitta parallel-sided, black, as wide as or nearly equal to width of parafrontal, 3rd antennomere, 1.2-1.8 times as long as 2nd, arista bare, inflated in basal ⅓-¼. Antenna and palpus black. Parafacial at level of antennal base 0.16-0.22 and gena 0.09-0.14 eye height. One regular row of postorbital setae, ocellar bristles short, or 1+8-12, fr 12-20, parafrontal covered with short black hairs, parafacial bare, gena and occiput with numerous short black hairs, light grey pollinose.

Thorax and legs black, grey dusted, mesonotum with 3 black or brown longitudinal stripes. ac 0-1+1, dc 1+2, ia 0+1, h 2-3, ph 1, npl 2-3 long and 5-10 strong. Scutellum with 3 pairs of long and strong marginals and 1-2 pairs shorter discals. tp with one ad. Wings hyaline, basicosta yellow, epaulet black, abdomen grey dusted with 3 dark spots on each tergite, those on tergite V often reduced. Tergites I+II and III with pair of mediomarginals, tergites IV and V with row of marginals. Genitalia black, medium-sized, pregonites hook-like aedeagus comparatively narrow and elongate (Fig. 54).

♀. Generally similar to ♂, but body more bright dusted. Genitalia see Fig. 59.

Body length 3.5-8.5 mm.

**Distribution:** The species is distributed over southern and central Europe, central Asia and in the Afrotropics. A vicariant species *A. auriceps* (Bar.) occurs in the Oriental and Australian Regions and Hawaii.

**Ecology:** Adult flies frequent sandy xerophytic habitats. Larvae develop as inquilines in the nests of Eumenidae: *Eumenes* sp., *E. pyriformis petiolaris* (Kurahashi 1972), *Rhynchium atrium* (Kurahashi 1972), and Sphecidae: *Sceliphron destillatorius* Illig. (Draber-Mońko 1966), *S. omissum* Kohl. (Rohdendorf 1935), *S. spirifex* F. (Baer 1921).

### *Amobia signata* (Meigen, 1824)

Syst. Beschr. 4: 303 *(Tachina).*

**Description**

This species is habitually extremely similar to *A. oculata* and differs from it only in genital structure. ♂ genitalia (Fig. 55) show hook-like pregonites and the aedeagus widens apically. ♀ genitalia (Figs 57, 58) show two elongate and one ovate spermathecae.

Body length 4.5-9.0 mm.

**Distribution:** Widely distributed in the Palaearctic and Afrotropical regions. Imagines prefer mesophytic habitats. Larvae develop in nests of various Eumenidae: *Allodynerus delphinalis* Gir., *Ancistrocerus nigricornis* Curt. (Séguy 1941a), *A. parietinus* (L.) (Weis 1960), *Discoelius zonalis* (Pz.), *Eumenes* sp., *E. pomiformis* (F.) (Séguy 1941a), *E. maxillosus* Deg. (Chapman 1959), *Odynerus reniformis* (Gmel.) (Séguy 1941a), *O. spinipes* L., *Synagris* sp. (Séguy 1941a), *Crossocerus* sp. (Pape 1987b), *Ectemnius cavifrons* (Th.), (Séguy 1941a), *Pemphredon* sp. (Baer 1921), *P. lugubris* Latr. (Séguy 1941a), *Psen atratinus* F. Mor.

(Chevalier 1925), *Psenulus* sp. (Becker et al. 1907), *Sceliphron eckloni* Dahlb. (Zumpt 1961), *S. spirifex* (L.), *Trypoxylon albitarse, T. attenuatum* Smith, *T. figulus* (L.) (Séguy 1941a) and Apidae: *Andrena cineraria* (L.), *A. fulvida* (Schck.), *A. haemorrhoa* (F.), *Osmia atricornis* (Latr.), *O. rufa* (L.) (Séguy 1941a).

### Tribe Phyllotelini Rohdendorf, 1935

Fliegen palaearkt. Reg. 11 (64h), Lf. 88: 96.

Antennal insertion situated below centre of eye, eyes often hairy, frons widened, genae narrow. Tergites of ovipositor (VII and VIII, rarely VI) bilobate.

23 genera and more than 100 species are distributed chiefly in tropical and subtropical Asia and Africa and in the South of the Palaearctic region, whereas from central Palaearctic only 2 genera and 3 species are known. The flies are xerophilic and psammophilic. Larvae of tropical taxa live in the nests of termites and ants, those of temperate European species are inquilinous in nests of sphecois wasps.

### Subtribe Metopodiina Rohdendorf, 1967

Trudy Paleontol. Inst. 116: 67.

The autapomorphies of this subtribe are shortly pubescent arista, and parafacials covered by short setae. Two genera are recognized, one is distributed in the Palaearctic region, namely the monobasic *Metopodia*, and one in Afrotropical region namely *Metopodiella* Zumpt with 8 species. The flies are xerophilous; nothing is known about the larval bionomics.

### Genus *Metopodia* Brauer & Bergenstamm, 1891

Denkschr. Akad. Wiss. Wien 58: 359.
**Type species:** *Metopodia grisea* Brauer & Bergenstamm, 1891.

**References:** Rohdendorf 1935, Fliegen palaearkt. Reg. 11 (64h), Lf. 88: 111-113; Séguy 1941, Encycl. ent. 21 (A): 302-303.

Grey, medium-sized or small flies. Head profile protruding, frons mid-wide, parafacials and genae about 0.25 eye height. 3rd antennal segment 1.5-2.2 times as long as 2nd, arista inflated in basal ⅕-¼. Proboscis elongate. Vibrissal angles situated above mouth margin. Ocellar and frontal bristles long and strong, or 1+2, strong. Thoracic bristles well developed, long and strong. $t_2$ with one ad. spl 1+1, propleuron bare. Wings hyaline, $R_5$ open, the ratio of 3rd and 5th costal sections 1 : 2-3, $r_1$ bare, $r_{4+5}$ with setae from base to level of r-m. Claws in ♂ short. Abdomen conical with three dark spots on each of tergites I+II-IV. Sexual dimorphism unapparent. One palaearctic species. Flies prefer sandy areas.

### *Metopodia grisea* Brauer & Bergenstamm, 1891

Denkschr. Akad. Wiss. Wien 58: 359.

*pilicornis* (Pandellé 1895). Revue Ent. 14: 304 *(Metopia)*.

#### Description

♂. Frons at vertex 0.27-0.34 (♂) or 0.38-0.42 (♀), parafacial at antennal base 0.33-0.40 (♂) or 0.40-0.45 (♀) head-width. Frontal stripe, parafrontal, parafacial and lunula yellowish grey dusted. Frontal stripe at fore orbital bristles 1.2-2.0 times as wide as parafrontal, and 1.5-2.7 times wider backwards. One row of postorbitals, vte strong, fr 7-12, occiput and gena grey with numerous black setae. 1st and 2nd antennomeres orange or yellowish red, 3rd antennomere black, palpus yellowish orange (Fig. 60).

Thorax grey, legs grey, mosonotum with very obsolescent narrow longitudinal stripes. ac 2-3+1-2, dc 2-3+3, ia 0-1+2, h 2-3, ph 1-2, npl 2 long +1-4 short. Mesonotum with three pairs of elongate strong

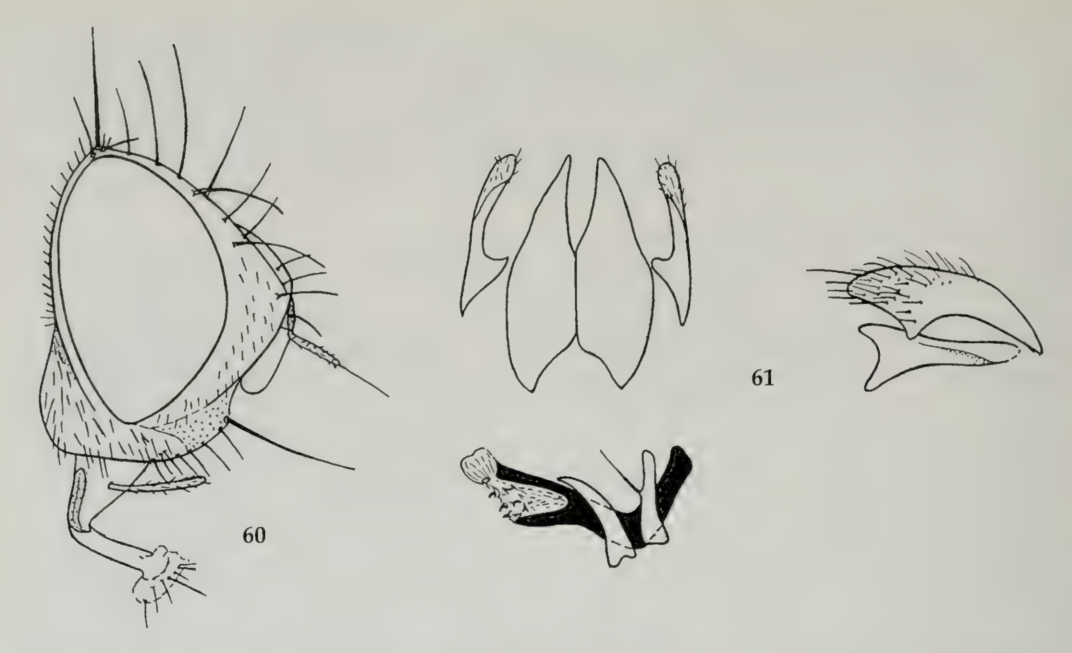



**Fig. 60.** *Metopodia grisea*. Male head, laterally.
**Fig. 61.** *Metopodia grisea*. Cerci and surstyli, dorsal (left) and ventral (right) view, aedeagus and gonites, laterally (bottom).

marginals and one pair of short hair-like discals, mesonotum covered with numerous short bristle-like black setae dorsally. Abdomen grey or yellowish grey dusted, dark spots on tergites present at least basally, tergite V with lustrous black band in hind ¼-⅓. Genitalia small, in ♂ lustrous black (Fig. 61). Abdominal tergites I+II without marginals, tergite III with one pair of mediomarginals, tergites IV and V with one row of marginals.

Body length 4.0-7.5 mm.

**Distribution:** Central and southern Europe, Turkey, Palestine, Iran, Central Asia and Mongolia. A psammophilic species preferring sandy areas on river banks.

### Subtribe Phyllotelina Rohdendorf, 1935

Sexual dimorphism well developed: arista in ♂ flattened, wings in ♂ often spotted. The next subtribal autapomorphies are narrow gena, shortened lower margin of head, m-vein obtusely curved, acrophallus elongate, one spherical and two elongate spermathecae, tergite X of ovipositor reduced. Three genera and 14 species are distributed in Palaearctic, Oriental and Afrotropical regions. Adults are psammophilic, larvae develop in sphecoid nests.

**References:** Zumpt 1973, Bull. Annls. Soc. r. ent. Belg. 109: 308-319; Rohdendorf 1975: Fliegen palaearkt. Reg. 11 (64h), Lf. 311: 230-235.

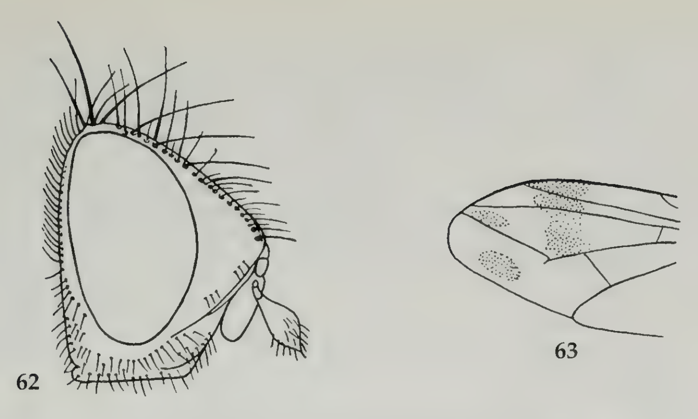



**Fig. 62.** *Phylloteles pictipennis.* Male head, lateral view (after Rohdendorf 1975).
**Fig. 63.** *Phylloteles pictipennis.* Apical part of male wing (after Rohdendorf 1975).

## Genus *Phylloteles* Loew, 1844

Stettin. ent. Ztg. 5: 168.
**Type species:** *Phylloteles pictipennis* Loew, 1844.

Small, brightly coloured flies. Frons in ♂ as wide as eye, in ♀ 1.5 times as broad, clypeus not narrowed downwards. 3rd antennomere 1.5-2.5 times as long as 2nd, arista short, pubescent, foliate flattened in ♂. Parafrontals broad, practically bare, proboscis short, palpi medium length, widened at apex. Eyes bare. Orbital and frontal bristles well developed, vibrissal bristles in ♂ completely reduced, in ♀ well developed. Gena shortly haired. Thoracic bristles well developed. ac 1-2+1, sometimes reduced, dc 2+3, spl 1+1. Propleuron bare. $t_2$ with one ad, claws and pulvilli short. Wings in ♂ spotted (Fig. 63), in ♀ hyaline; $R_5$ broadly open, ratio of 3rd and 5th costal sections 1 : 2.5-3.5. Costal spine absent, $r_1$ bare, $r_{4+5}$ with several short bristles at base. Abdominal tergites with spots, genitalia in ♂ medium-sized. 7 species distributed in the Palaearctic and Afrotropical regions, 3 species palaearctic.

## *Phylloteles pictipennis* Loew, 1844

Stettin. ent. Ztg. 5: 168.

### Description

♂. Frons at vertex 0.32-0.34 and at antennal base 0.33-0.40 head width, frontal vitta 2-2.5 times wider apically, at fore orbital bristles 0.6-0.8 times as wide as parafrontal. Head silvery grey pollinose, frontal vitta often with yellowish tinge. Parafacials in profile (Fig. 62) 0.26-0.33, and gena 0.13-0.17 head height. Arista foliate flattened and white or yellowish white in distal half, basal half of arista and 3rd antennomere greyish black, 1st and 2nd antennomeres yellowish red, palpi yellow. 3rd antennomere 1.5-2.2 times as long as 2nd. One regular row of postorbitals, vte long, shorter than vti, oc long and strong, or 1+3-4, strong, fr 11-16, medium-sized, parafrontal and parafacial practically bare, with some microscopic setae, gena covered with fine white hairs, vibrissal and oral bristles reduced.

Thorax grey pollinose. Longitudinal stripes of mesonotum linear, poorly developed. ia 0+2, h 2-3, ph 1, 2 long and 2-4 short. Soutellum with 3 pairs of long marginals and with 2-3 pairs of hair-like discals. Thoracic setae black, basicosta and epaulet yellow. ♂ forewing Fig. 63.

Abdominal tergites I+II without marginals, tergite III with pair of erect mediomarginals, tergites IV and V with row of marginals. Abdomen grey pollinose, yellowish laterally and ventrally, tergites I+II brownish black, tergite III with large medial black spot and pair of small lateral spots which can be reduced. Tergite IV with 5 black spots in its hind ¼-⅕ the lateral spots can be yellowish brown; tergite V with 5 elongate brownish black or black spots in hind 0.7-0.9. Genitalia lustrous black.

♀. Frons at vertex 0.4-0.44 and at antennal base 0.34-0.5 head width. Frontal vitta 1.5-1.8 times wider at vertex, at fore or as wide as one parafrontal, brownish black, less pruinose. 3rd antennomere 2.2-2.5 times as long as 2nd. Arista widened in basal ⅓ and slightly flattened. Vibrissae and oral bristles well developed. Wings hyaline. Black abdominal spots more developed than in ♂, genitalia brownish black.

Body length 3.5-6.5 mm.

**Distribution:** Central and southern Europe, Turkey, Transcaucasus, western Siberia and Turkmenistan. Psammophilous species, the flies feed at flowers of Asteraceae, Euphorbiaceae, Apiaceae etc. Larvae in nests of the sphecoid wasp *Philanthus triangulum* F. (Charykuliev & Myarceva 1964).

## Tribe Oebaliini Rohdendorf, 1967

Trudy Paleontol. Inst. 116: 68.

Antennal base situated at about half eye height. Frons not wide, parafacials wide or moderately wide, genae narrow, ♂ terminalia very complicated, body size small. Two subtribes: *Nyctellina* and *Oebaliina*.

## Subtribe Oebaliina Rohdendorf, 1967

Small grey flies, the larvae are inquilines in sphecoid nests built in the pith of raspberry canes and other bushes. ♂ genitalia very complicated: cerci curved, acrophallus elongate and curved, ventralia well developed, spinose. One palaearctic and one holarctic genus, comprising about 10 species.

## Genus *Oebalia* Robineau-Desvoidy, 1863

Hist. Nat. 2: 414.
**Type species:** *Oebalia anacantha* Robineau-Desvoidy, 1863 (syn. of *Tachina cyllindrica* Fallén, 1810).

**References:** Rohdendorf 1963: Beitr. Ent. 13: 445-454; 1975: Fliegen palaearkt. Reg. 11 (64 h.), Lf. 311: 187-189, 190-196.

Small to medium-sized grey flies. Frons narrower or as wide as eye, parafacials of medium width, gena narrow. Antenna elongate, 3rd antennomere 2-6 times as long as 2nd, arista inflated in proximal 0.6-0.8. Orbitals and frontals strong, parafacials covered with short hairs, facial ridge bare or with short setae. Proboscis short, palpus thick. Vibrissal angles not raised over oral margin.

Thorax with strong bristles: ac 0-1+1, dc 2+3, propleura bare. Mid tibia with one ad bristle. $R_5$ open, occasionally closed or short petiolate, costal spine small.

Abdomen oval, terminalia protruding, abdominal tergites with black spots. Nine palaearctic species. Flies frequent busthes, the larvae in nests of stalk-nesting Sphecidae.

### Key of species of *Oebalia*

1. Abdominal tergites III and IV each with one longitudinal medial spot, and lateral spots very small and not clear. 3rd antennomere 0.3-0.4 times as long as 2nd ................................ *O. unistriata* Rohd.
– Abdominal tergites III and IV each with 3 spots .................................................................................. 2.
2. Abdominal spots coalescing on hind margin of tergites. Parafacials haired on upper 0.5-0.7. 3rd antennomere 2.5-3 times as long as 2nd ................................................................... *O. cyllindrica* (Fall.)
– Abdominal spots separated by pollinosity which reaches hind margin. Parafacial plates entirely haired. 3rd antennomere 3-6 times as long as 2nd ............................................. *O. sachtlebeni* Rohd.

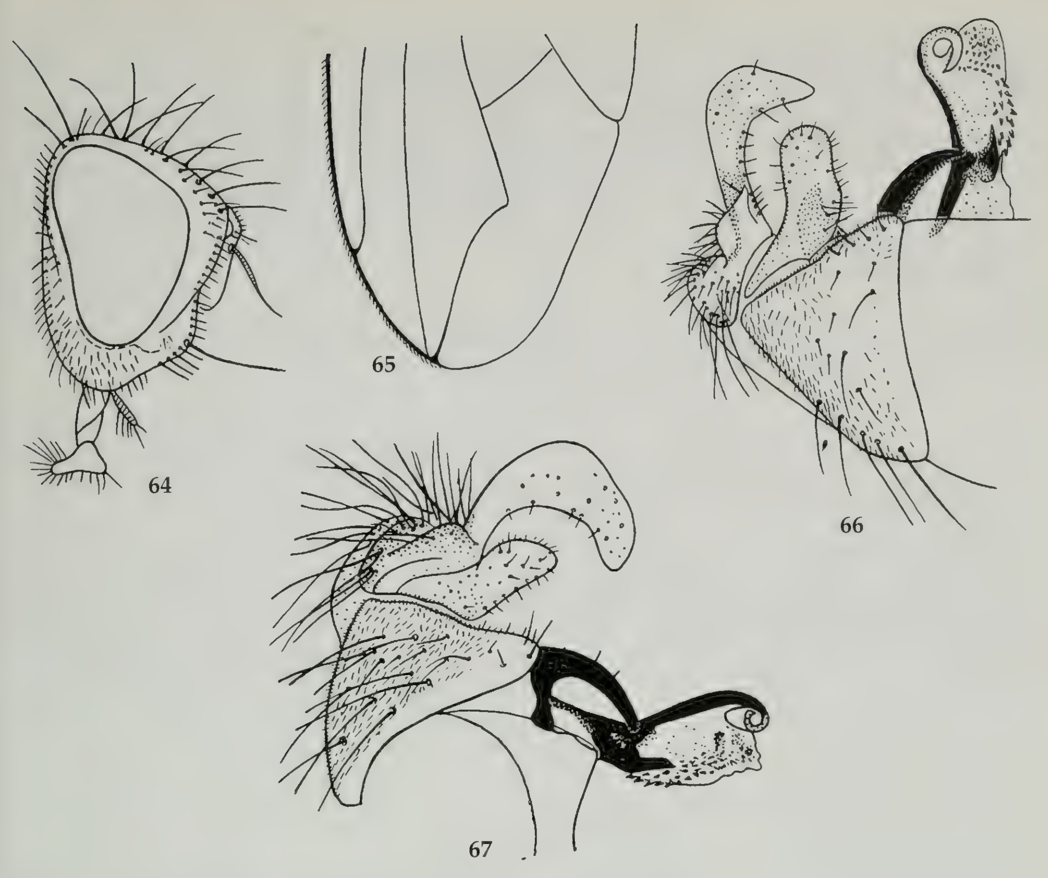



**Fig. 64.** *Oebalia cyllindrica*. Male head, lateral view (after Rohdendorf 1975).
**Fig. 65.** *Oebalia cyllindrica*. Female, apical part of wing (after Rohdendorf 1975).
**Fig. 66.** *Oebalia cyllindrica*. Male genitalia, lateral view (after Rohdendorf 1963).
**Fig. 67.** *Oebalia sachtlebeni*. Male genitalia, lateral view (after Rohdendorf 1963).

### *Oebalia cyllindrica* (Fallén, 1810)

Kön. Vetensk. Akad. Handl. (2) 3l: 279 *(Tachina)*.

*convexula* Zetterstedt, 1838. Ins. Lapp. 638 *(Tachina)*.
*picciolii* Rondani, 1859. Dipt. Ital. Prodr. 3: 119 *(Sphixapata)*.
*anacantha* Robineau-Desvoidy, 1863. Hist. Nat. 2: 415.

#### Description

♂. Frons at vertex 0.3-0.35 and at antennal base 0.3-0.33 head width. Parafrontals, parafacials, lunula and gena silvery grey pollinose, frontal vitta black, slightly light dusted; at fore or 1.5-2.2 times as wide as one parafrontal, slightly widened backwards. Antenna black. 3rd antennomere 2.5-3.0 times as long as 2nd, 2nd antennomere often reddish brown, palpi brown or blackish brown. Parafacials at antennal base about 0.2-0.23 and gena 0.09-0.16 eye heiht. One row of strong postorbital bristles, vte strong, or 1+3-3, fr 8-11 (Fig. 64), parafacials haired on interior margin in upper 0.5-0.7, facial ridge with black setae at about lower 0.5th. Gena and metacephalon black haired, metacephalon black, grey dusted.

Thorax black, with sparse grey pollinosity, mesonotum with 3 black longitudinal spots. ia 0+2, h 3, ph 1, npl 2, short notopleural bristles absent, spl 1+1. Scutellum with 3 pairs of marginals and 1-2 pairs

of shorter discals. Claws about as long as 5th tarsomere. Legs black, wings hyaline. $r_1$ bare, $r_{4+5}$ with several short black setae at base, m-vein obtusely angled (Fig. 65), m-cu not curved, ratio of 3rd and 5th costal section 1:2. Basicosta yellow, epaulet brownish black.

Abdomen oval, silvery grey, often olive tinged, dusted. Tergites I+II and III without strong marginals, IV and V tergites each with a row of marginal bristles, genitalia medium-sized (Fig. 66). Tergites I+II black, tergites III and IV with 3 black elongate spots which coalesce at hind margin. Tergite V with narrow lined madial spot. Genitalia black, grey dusted, cerci yellow.

♀. Like ♂, but frons narrower (0.25-0.32 head width), claws curved and short (not more than 0.7 length of 5th tarsomere).

Body length 3-6 mm.

**Distribution:** Widely distributed in Europe, southern Siberia and Mongolia. Larvae have been bred from nests of Sphecidae: *Crossocercus* sp. (Lundbeck 1927), *C. cinxius* Dhlb. (Kramer 1920), *C. capitosus* Shuck. (Kramer 1920), *C. annulipes* Lep. & Brullé (Tiensuu 1939).

### *Oebalia sachtlebeni* Rohdendorf, 1963

Beitr. Ent. 13: 448.

**Description**

♂. Frons at vertex 0.34-0.37 and at antennal base 0.35-0.39 head width. Head silvery grey dusted, frontal vitt black, at fore orbital bristles 1.5 times as wide as one parafrontal, slightly widened at vertex. Parafacials in profile equal 0.25-0.28 and gena 0.18-0.23 eye height. 3rd antennomere 4.5-6 times as long as 2nd, arista inflated in proximal 0.7-0.8. Antennae and palpi black, basal antennomeres often brownish. One row of postorbital bristles, vte strong, ocellar bristles moderate, or 1+2-3, strong, fr 7-9, parafrontals with several black setae, parafacials rather densely haired. Facial ridge with black setae in lower 0.4-0.5. Gena and metacephalon covered with black hair-like bristles.

Thoracic chaetotaxy as in *O. cyllindrica*. Claws about as long as 5th tarsomere. Wings as in *O. cyllindrica*. Thorax grey pollinose, mesonotum with 3 longitudinal stripes, legs black, wings hyaline.

Abdomen oval. Genitalia protruding, cerci broader than in *O. cyllindrica* (Fig. 67). Abdomen grey dusted, tergites I+II black, tergites III and IV each with 3 black spots separated by pollinosity which reaches hind margin, tergite V with one black medial stripe only.

♀. Like ♂, but 3rd antennomere only 3-4 times as long as 2nd, parafacials in profile equal 0.2-0.23 eye height.

Body length 4-6 mm.

**Distribution:** Germany, Poland, Denmark, Norway, Russia (St. Petersbourgh district). Larvae live in nests of sphecoid wasps of the genera *Pemphredon* and *Rhopalum* (Draber-Mońko 1978).

### *Oebalia unistriata* Rohdendorf, 1963

Beitr. Ent. 13: 449.

**Description**

♂. Frons at vertex 0.37-0.4 and at antennal base 0.39-0.42 head width. Frontal vitta 1-3-1. 7 times widened at vertex, at fore orbital bristles 1.5-2.0 times as wide as one parafrontal. Head grey pollinose with yellowish tinge, frontal vitta black, slightly light dusted. Profile of parafacials 0.36-0.40 and genae 0.15-0.20 eye height. Arista inflated in proximal 0,8th. 3rd antennomere 3.5-4 times as long as 2nd. Antennae and palpi black. One row of postorbital setae, vte and ocellar bristles strong, or 1+2, fr 7-10, strong, parafrontals and parafacials covered with black setae, facial ridge with a row of black hairs in lower 0.5-0.6. Genae and metacephalon with numerous short black bristles.

Thorax yellowish grey pollinose, longitudinal stripes of metacephalon indistinct. ia 0+2, h 2-3, ph 1, npl 2, short notopleural hairs absent, spl 1+1. Scutellum with three pairs of elongate marginals and one pair of short discals. Claws elongate, $r_1$ bare, $r_{4+5}$ with few short setae basally, ratio of 3rd and 5th costal sections 1 : 2. $R_5$ narrow, open, m-vein right-angled, m-cu not curved. Legs black, wings hyaline,

basicosta yellow to light brown, epaulet brownish black.

Genitalia protruding, very similar to those of *O. sachtlebeni*. Abdomen black, grey dusted, genitalia black, cerci yellow. Tergites I+II entirely black, tergites III and IV with broad medial stripe and with indistinct paired lateral spots, tergite V grey dusted, with indistinct medial stripe.

♀. Frons narrower than in ♂ (about 0.33-0.38 head width), 3rd antennomere 3 times as long as 2nd. Parafacials 0.18-0.25 and genae 0.1-0.15 eye height. Claws curved and short. Thorax intensively light grey dusted, lateral abdominal spots indistinct or absent.

Body length 3.5-5.5 mm.

**Distribution:** Poland, Hungary, Ukraine, North Kazakhstan, southern Siberia, Mongolia. Larval bionomy unknown.

## Genus *Ptychoneura* Brauer & Bergenstamm, 1889

Denkschr. Akad. Wiss. Wien 56: 104.
**Type species:** *Tachina rufitarsis* Meigen, 1824 (syn. of *Tachina minuta* Fallén, 1810).

Small to medium-sized grey flies. Frons narrower than width of eye, parafacial moderately wide, gena narrow. 3rd antennomere 3-6 times as long as 2nd, arista inflated in proximal 0.7-0.9. Orbitals and frontals strong, parafacials hairy only in upper part, facial ridge with several strong bristles. ac 0+1, short, dc 2+3, strong, propleuron bare, claws elongate. Mid-tibia with one ad-bristle. $R_5$ open, $r_1$ bare. $r_{4+5}$ with few setae at base. Abdomen oval, ♂ terminalia rather robust. Acrophallus united with dorsolateral arms of paraphallus, widened, well sclerotized, ventral protuberance distinct. Abdomen with chequered pattern, without spotting. 3 species in Holarctic and Neotropical regions. Flies frequent bushes, larvae develop in nests of stalk-nesting Sphecidae.

**References:** Rohdendorf 1963: Beitr. Ent. 13: 445-447; 1975: Fliegen palaearkt. Reg. 11 (64 h.), Lf. 311: 189-190; Pape 1989: Ent. Scand. 19: 349-354.

### *Ptychoneura minuta* (Fallén, 1810)

K. Vetensk. Akad. Handl. (2) 31: 275 *(Tachina).*

*melaleuca* (Meigen 1824). Syst. Beschr. 4: 410 *(Tachina).*
*rufitarsis* (Meigen 1824). ibid.: 410 *(Tachina).*
*rubritarsis* (Zetterstedt 1859). Dipt. Scand. 13: 6087 *(Tachina).*
*flavitarsella* (Zetterstedt 1859). ibid. 13: 6079 *(Tachina).*

#### Description

♂. Frons at vertex 0.26-0.33 and at antennal base 0.32-0.35 head width. Frontal vitta 1.5-2 times wider towards vertex, at fore or 1.3-1.5 times as wide as one parafrontal. Head grey dusted with yellowish to olive tinge, frontal vitta black, slightly light dusted. Parafacials at level of antennal base 0.16-0.27 and gena 0.06-0.13 eye height. Arista inflated in proximal 0.7-0.8. 3rd antennal segment 4-7 times as long as 2nd. Proboscis short. Antenna black, palpi brown, yellowish at apex. One row of regular postorbital setae, vte strong, ocellar bristles long and thick, or 1+2, fr 6-10, parafrontals and upper ⅓ of parafacials covered with strong black hairs, lower parts of parafacials bare, gena and metacephalon dark grey dusted, with numerous setae.

Thorax grey pollinose, longitudinal stripes of mesonotum reduced. ia 0+2-3, h 2-3, ph 1, npl 2, short bristles absent, occasionally 1-2 present, spl 1+1. Legs black with yellowish tarsi (♀ tibia also frequently yellowish). Costal spine small. Ratio of 3rd to 5th costal section 1 : 1.7-2.0. m-cu not curved. Basicosta yellow, epaulet brownish black. Genitalia see Figs 68, 69.

Body length 3.5-6.0 mm.

**Distribution:** Widely distributed in the Palaearctic region ranging from the British Isles to Japan. Larvae develop in nests of *Sphecidae*: *Crossocerus cinxius* Dahlb. (Kramer 1917), *Rhopalum clavipes* (L.), *Rh. coarctatum* (Dahlb.) (Lomboldt 1976, Sanborne 1982).

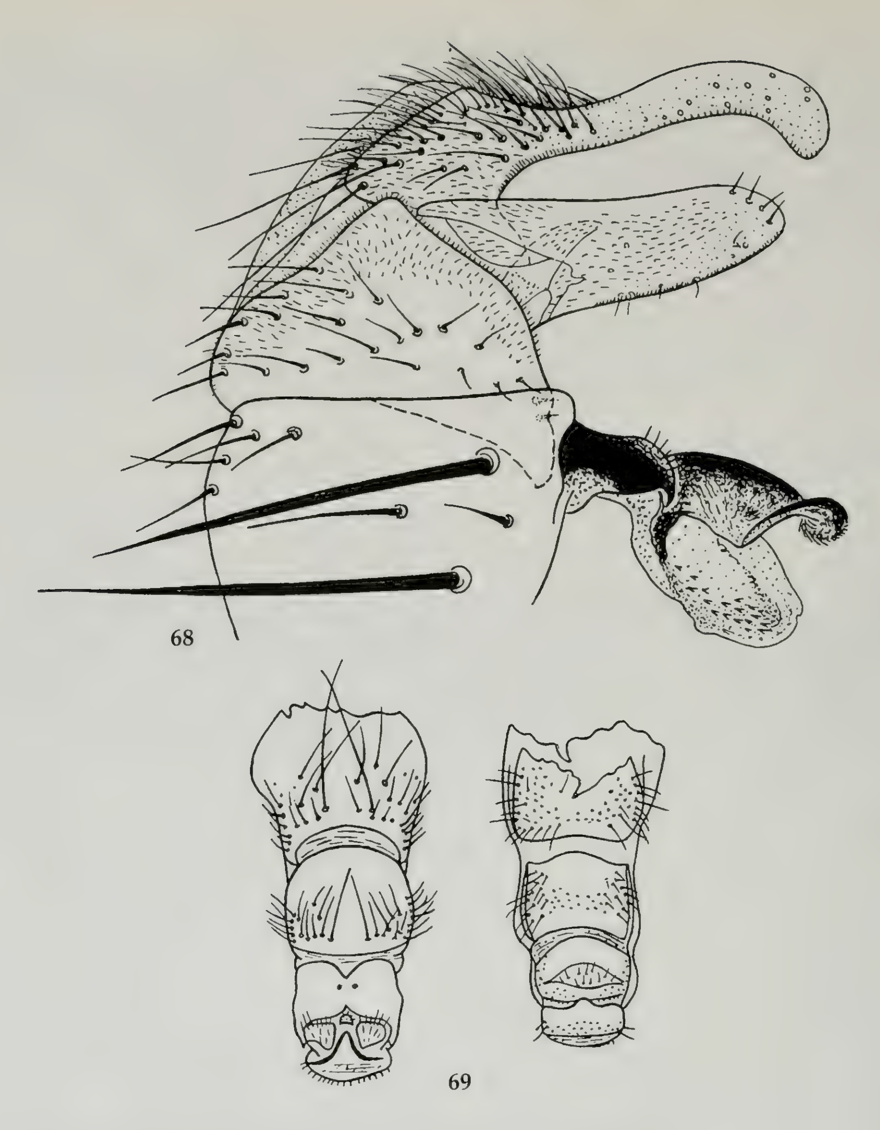



**Fig. 68.** *Ptychoneura minuta*. Male genitalia, lateral view (after Rohdendorf 1963).
**Fig. 69.** *Ptychoneura minuta*. Ovipositor dorsally and ventrally (after Kurahashi 1971).

## Tribe Metopiini Townsend, 1908

Wash. Smith. Inst., Misc. Coll. 51: 65.

The tribe is characterized by such autapomorphic characters as very wide frons and parafacials, generally narrow cheek, short proboscis, 3rd antennomere usually more than twice as long as 2nd, and usually by well developed sexual dimorphism. Small or medium-sized flies, black and grey or silvery dusted. 11 genera with about 150 species are distributed in all regions excepting Australia and New Zealand. Larvae are nest inquilines of various aculeate Hymenoptera, chiefly Sphecoidea.

## Subtribe Taxigrammatina Rohdendorf, 1967

Trudy Paleontol. Inst. 116: 61.

Small pale flies, $R_5$ closed or petiolate, wings rather costalized, costal spine elongate. Abdomen conical with black spots or bands. 3 genera comprising about 20 species distributed in the Holarctic, Oriental, Afrotropical and Madagascan regions. Flies are psammophilic, the larvae have heen found in sphecoid wasp nests.

## Genus *Hilarella* Rondani, 1856

Dipt. Ital. Prodr. 1: 70.
**Type species:** *Miltogramma hilarella* Zetterstedt, 1844.

Grey or yellowish small-sized species (3-6 mm). Frons conical, frontal stripe broad, widened apically. 3rd antennomere 1.5-3 times as long as 2nd, arista shortly haired. Last section of cu-vein (from m-cu to wing margin) 0.5 times length of previous section. Claws and pulvilli of ♂ curved and short. Fore tarsus of ♂ with elongate av. (Fig. 82).

♂ genitalia: Cerci hook-formed, surstyli elongate, straight, epiphallus well developed, acrophallus shortened. 5 Holarctic, Afrotropical and Neotropical species.

**References:** Rohdendorf 1935: Fliegen palaearkt. Reg. 11 (64 h.), Lf. 88: 113-116; Pape 1987: Fauna ent. scand. 19: 57-61.

### Key to species of *Hilarella*

1. Head and body silvery grey dusted. 3rd entennomere 2-3 times as long as 2nd. Each abdominal tergite with 3 large well developed black spots ........ *H. hilarella* (Zett.)
– Head and body yellowish grey dusted. 3rd antennomere 1.5-2 times as long as 2nd. Each abdominal tergite with pair of small, often reduced lateral spots and bilobate medial spot ........ *H. stictica* (Mg.)

## *Hilarella hilarella* (Zetterstedt, 1844)

Dipt. Scand. 3: 1212 *(Miltogramma)*.

### Description

♂. Frons at vertex 0.3-0.37 and at antennal base 0.37-0.41 head width. Frons and parafacials silvery grey dusted, frontal vitta at level of fore or as wide as one parafrontal, 1.5-2.5 times wider towards vertex. Vertex silvery grey dusted, grey anterior. Profile of parafacials 0.2-0.25 and genae 0.12-0.16 eye height. 1st, 2nd and basal part of 3rd antennomere yellowish to reddish, apical part of 3rd antennomere greyish black, palpi yellow (Fig. 70). One regular row of postorbitals, vte well developed, oc strong and distinct, or 1+2-3, strong, fr 7-11, parafrontals and parafacials densely covered with black

hairs, vibrissal ridge with 3-4 short setae above vibrissae. Genae and metacephalon grey, covered with densely black hairs.

Thorax grey, densely pollinose, without stripes on mesonotum. Chaetae of thorax strong. ac 0-2+1, short, dc 2+3, strong, ia 0+2-3, h 2, ph 1-2, npl 2, notopleura without short hairs, spl 1+1, propleuron bare. Scutellum with three pairs of elongate marginals and one pair of shorter discals. $t_2$ with 1 ad or this bristle absent. Femora and tarsi black, light grey dusted, trochanters and tibia yellowish to brown. Wings (Fig. 74) hyaline. $R_5$ closed or very shortly petiolate, ratio of 3rd and 5th sections of costa 1 : 2-3, $r_1$ bare, $r_{4+5}$ with few bristles at base. Basicosta and epaulet yellow.

Abdomen conical, grey dusted, each tergite with three dark brown to black spots (Fig. 79). Tergites I+II without marginals, tergites III and IV with mediomarginal bristles, tergite V with row of marginals. Genitalia small, lustrous black (Fig. 77).

♀. Frons wider than in ♂ (0.39-0.42 head width). Head and body paler dusted. Fore tarsus without elongate av.

Body length 3.5-6.0 mm.

**Distribution:** Widespread in the Holarctic and in the northern part of the Neotropical regions. Flies are psammophilous. Larvae develop in nests of sphecoid wasps: *Ammophila violaceipennis* Lep. (Allen 1926), *A. sabulosa* L. (Tiensuu 1939), *Podelonia communis* Cresson, *P. luctuosa* Smith (Newscommer 1930), *P. occidentalis* (Evans 1987), *P. argentifrons* auct. (O'Brien 1983).

### *Hilarella stictica* (Meigen, 1824)

Syst. Beschr. 6: 367 *(Miltogramma).*

*dira* Robineau-Desvoidy 1830. Essai Myod.: 95 *(Megaera).*
*siphonina* (Zetterstedt 1844). Dipt. Scand. 3: 1213 *(Miltogramma).*

**Description**

♂. Frons at vertex 0.31-0.36 and at antennal base 0.35-0.40 head width. Head yellowish grey dusted, frontal vitta at level of anterior orbital bristles 0.4-0.6 times as wide as one parafrontal, 2-3 times wider towards vertex. 3rd antennal segment 1.4-2.0 times as long as 2nd, arista widened in basal 0.2-0.3, with short hairs. 1st and 2nd antennomeres yellow to orange, 3rd antnnomere grey or brownish grey, seldom yellow in basal part. Parafacial profile 0.18-0.22 and gena 0.09-0.18 eye height. One row of postorbitals, vte strong, ocellars fine, or 1+2-3, fr 6-10, strong, parafrontals without hairs in addition to or and fr, parafacials with black hairs (Fig. 71). Palpi yellow. Gena and metacephalon light grey dusted, with numerous black hairs.

Thorax yellowish grey dusted, metacephalon without longitudinal stripes. Thoracic bristles strong. ac 2+1, dc 2+3, ia 0+2, h 2-3, ph 1-2, npl 2, notopleura without short setae, spl 1+1, propleuron bare. Scutellum with 3 pairs of elongate marginals and 1-2 pairs of short hair-like discals. $t_2$ with 1 ad, or this bristle is absent. Femora and tarsi grey pollinose, blackish; tibia yellow to orange. Wings as in *H. hilarella*.

Abdomen (Fig. 79, right) densely grey dusted, with intensive yellow tinge. Tergites with more of less distinct paired medial spots and with pair of lateral spots, which are frequntly reduced. Tergites I+II without marginals, tergites III and IV with pair of elongate mediomarginal bristles, tergite V with row of marginals. Genitalia small, black lustrous, similar to those of *H. hilarella*.

♀. Frons wider than in ♂ (0.38-0.43 head width); abdominal spots often more of less reduced, fore tarsus without elongate av.

Body length 3-6.5 mm.

**Distribution:** Europe except British Isles, southern Siberia and Mongolia.

Flies frequent dry grassland and sandy areas. Larvae are inquilines in nests of *Sphecoidea: Ammophila heydeni* Dahlb., *A. hirsuta* Bongg. (Séguy 1941a), *A. sabulosa* Scop. (Maneval 1929), *Bembix integra* Pz. (Séguy 1941a), *Sphex albicestus* Lep. (Ferton 1901), *S. caeruleum* Dr. (Ferton 1902) (syn. *S. subfuscatus* Dhnb.)

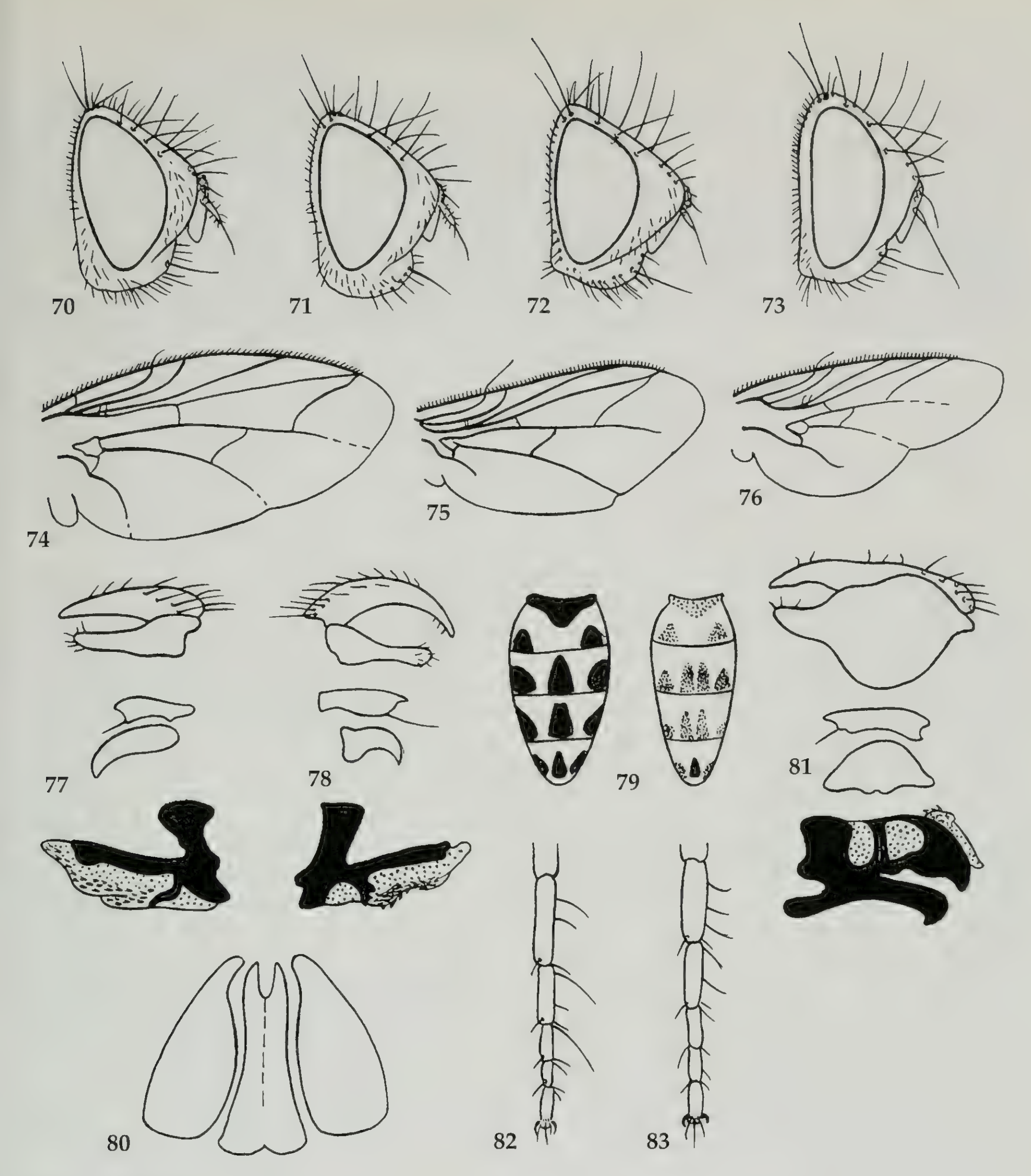



**Fig. 70.** *Hilarella hilarella*. Male head laterally.
**Fig. 71.** *Hilarella stictica*. Male head laterally.
**Fig. 72.** *Paragusia elegantula*. Male head laterally.
**Fig. 73.** *Taxigramma heteroneura*. Male head laterally.
**Fig. 74.** *Hilarella hilarella*. Male wing.
**Fig. 75.** *Paragusia elegantula*. Male wing.
**Fig. 76.** *Taxigramma heteroneura*. Male wing.
**Fig. 77.** *Hilarella hilarella*. Male genitalia, laterally.
**Fig. 78.** *Paragusia elegantula*. Male genitalia, laterally.
**Fig. 79.** *Hilarella*, dorsal view of abdomen, left *H. hilarella*, right *H. stictica*.
**Fig. 80.** *Taxigramma heteroneura*. Male cerci and surstyli.
**Fig. 81.** *Taxigramma heteroneura*. Male genitalia, lateral view.
**Fig. 82.** *Hilarella hilarella*. Male fore tarsus dorsally.
**Fig. 83.** *Paragusia elegantula*. Male fore tarsus dorsally.

## Genus *Paragusia* Schiner, 1861

Wien. ent. Nachr. 5: 123.
**Type species:** *Paragusia frivaldzkii* Schiner, 1862 (syn. of *Tachina elegantula* Zetterstedt, 1844).

Small species (body lenth 3-6 mm) with grey or yellowish ground coloration. Frons conical, lower margin of head very short, 3rd antennomere elongate (2-5 times as long as 2nd antennomere), arista bare. Last section of cu-vein (from m-cu to wing margin) 1-2 times as long as previous section. Claws and pulvilli of ♂ short. Aedeagus with long epiphallus and shortened acrophallus. 15 species are distributed in the Palaearctic and Afrotropical regions.

**References:** Rohdendorf 1935: Fliegen palaearkt. Reg. 11 (64), Lf. 88: 119-126; Verves 1984: Insects of Mongolia 9: 544-549.

### *Paragusia elegantula* (Zetterstedt, 1844)

Dipt. Scand. 3: 1024 *(Tachina).*

*frivaldzkii* Schiner, 1862. Fauna austr. 1: 500.

#### Description

♂. Frons at vertex 0.38-0.43 and at antennal base 0.42-0.46 head width. Head silvery dusted, fontal vitta at fore or 0.2-0.4 times width of parafrontal, 3-4 times wider towards vertex. 3rd antennomere 2.5-4.5 times as long as 2nd, arista bare, widened at basal 0.4-0.5, antennae black, grey dusted, apical part of 2nd antennomere often reddish. Palpi yellowish brown to blackish brown. Parafacials at level of antennal base 0.29-0.39 and gena 0.08-0.12 eye-height. One row of postorbitals, vte well developed, ocellars not strong, or 1+2, fr 6-9, only medial 4-5 pairs strong. Parafrontal without hairs, parafacials with 1-3 irregular rows of black setae (Fig. 72). Gena in fore part with black hairs, in hind part with yellowish brown setae; metacephalon with numerous short black hairs.

Thorax silvery grey dusted, mesonotum between dorsocentral bristles sligtly iridescent fuscous. ac 2-3+1-2, presutural bristles non-paired, prescutellar pairs strong. dc 2+3-4, very strong. ia 0+2, h 2-3, ph 1, npl 2, notopleura without short setae, spl 1+1, propleura bare. Scutellum with 3 pairs of elongate marginals, discals 1-2 pairs, rather fine. Fore tarsus with long av on 1st-4th tarsomere (Fig. 83). Wings hyaline (Fig. 75), apical section of cu equal to previous section, ratio of 3rd and 5th sections of costa 1 : 3-3.5. $R_5$ shortly petiolate or closed, $r_1$ bare, $r_{4+5}$ with some hairs at base, m-cu sigmoid. Legs black, basicosta and epaulet yellow to light brown.

Abdomen conical, grey dusted. Tergites I+II without marginals, tergites III and IV with paired mediomarginal bristles, tergite V with row of marginals. Genitalia small (Fig. 78), lustrous black. Tergites I+II completely black, tergites III and IV with 3 dorsal black spots, occasionally coalescing into a transverse black band. Abdomen dorsally lustrous black.

♀. Body generally more bright, frons wider than in ♂ (0.4-0.45 head width), frontal vitta at fore or as broad as parafrontale and with yellowish pruinescence. Antennae and palpi yellow, 3rd antennomere partly blackish. Fore tarsus without erect av. Legs generally more or less yellowish. Spots on abdominal tergites smaller than in ♂ and not coalescing.

Body length 4-6 mm.

**Distribution:** Widely distributed in southern and central Europe, central Asia, southern Siberia and Mongolia. A very xerophilic species preferring sandy areas. Larvae are recorded from nests of ants, *Formica cinerea* Mayr (Kramer 1917), but this information needs confirming.

## Genus *Taxigramma* Perris, 1852

Annls. Soc. Linn. Lyon. 209.
**Type species:** *Taxigramma pipiens* Perris, 1854 (syn. of *Miltogramma heteroneura* Meigen, 1830).

*Heteropterina* Macquart, 1854 Annls. Soc. ent. Fr. (3) 2: 426.
**Type species:** *Miltogramma hetoroneura* Meigen, 1830.

Small, brownish grey flies. Frons moderately protruding, lower margin of head moderately short. 3rd antennomrre short, not more than twice as long as 2nd. Parafrontal without black hairs, parafacial bare or with very fine hairs at lower part. Claws of ♂ elongate. Last section of m-cu twice as long as previous section. Abdomen with black spots. Genitalia of ♂ protruding, cerci fused at basal 0.8, apex of paraphallus widened and pointed, basal part of surstyli very broad. Two species occur in the Holarctic and Oriental regions.

### *Taxigramma heteroneura* (Meigen, 1830)

Syst. Beschr. 6: 367 *(Miltogramma)*.

*pipiens* Perris, 1852. Annls. Soc. linn. Lyon 209.

**Description**

♂. Frons at vertex 0.3-0.39 and at antennal base 0.35-0.42 head width. Parafrontal, parafacial and lunula silvery grey pollinose. Frontal vitta blackish, slightly pale dusted, at fore or 4-5 times narrower than one parafrontal, towards vertex 3-4 times wider. 3rd antennomere 1.4-2 times as long as 2nd, arista widened at basal 0.2-0.3, bare. 1st and 2nd antennomeres brownish to yellow, 3rd antennomere dark grey, at base often reddish, palpi yellow. Parafacials at level of antennal base 0.14-0.2 and genae 0.1-0.12 eye height (Fig. 73). Two regular rows of postorbitals, upper part of metacephalon behind postorbitals bare, vte and oc strong, or 1+2, fr 6-9, only medial 4-5 pairs strong, genae and metacephalon grey, genae with erect black hairs, lower part of metacephalon with black and brownish setae.

Thorax grey or brownish grey dusted, ac 2+1, weak, dc 2+3, strong, ia 0+2, h 2-3, ph 1, npl 2, notopleura without short hairs, spl 1+1, propleuron bare. Scutellum with three pairs of very strong marginals, discals indistinct, $t_2$ with one ad, elongate sensory hairs of fore tarsus absent. Legs black, knees reddish, tibia often partly brownish. Wings hyaline (Fig. 76). $R_5$ closed, ratio of 3rd and 5th costal sections 1:2. $r_1$ bare, $r_{4+5}$ with few hairs at base, 3rd section of medial vein (between r-m and m-cu) shorter or as long as its 4th section. Basicosta and epaulet yellow.

Abdomen conical, grey dusted, with lateral brownish yellow areas. All tergites with three black or reddish spots on dorsal surface, and pair of elongate lateral spots which are often indistinct on tergites I+II and III. Tergites I+II without bristles, tergites III and IV each with pair of strong mediomarginals, tergite V with row of marginal bristles. Genitalia protruding (Figs 80, 81).

♀. Head often yellowish grey dusted, antenna entirely yellow, 3rd antennomere sometimes partly grey, arista dark. Legs orange or yellow, only tarsi black. Claws shortened.

Body length 3-5.5 mm.

**Distribution:** Widely distributed in the Holarctic and Oriental (India) regions. Flies frequent sandy areas and dry grassland. Larvae found in nests of sphecoid wasps: *Ammophila* (Pape 1987), *Tachysphex tenuipunctus* Fox (Rees 1973) *Podalonia occidentalis* Murray (Evans 1987).

### Subtribe Metopiina Townsend, 1908

This subtribe consists of a single genus – *Metopia* Meig. The most important characters are a single row of long bristles close to facial ridge at parafacials, and two rows of orbital bristles: inner row reclinate and outer proclinate. Head profile triangular, frons and parafacials broad, hind head margin very short, proboscis short.

### Genus *Metopia* Meigen, 1803

Magazin Insektenk. 2: 280.
**Type species:** *Musca leucocephala* Rossi, 1790 (nom. preocc.); valid name *Tachina argyrocephala* Meigen, 1824.

Grey, medium-sized flies (4-8 mm). Sexual dimorphism strong or moderate: ♂ mostly with special tarsal setae and lustrous, silvery dusted fore part of frontalia. $R_5$ open, claws short (in palaearctic taxa), mid tibia with 1 ad, abdomen conical. Epiphallus present, acrophallus medium-sized, surstyli long. Tergite X in ovipositor absent. Hypopharyngeal sclerite of first instar larva broadly triangulate. Some 40 species are distributed in all zoogeographical regions. Flies frequent bushland and other intrazonal habitats, some species are stenotopic: *M. roseri* prefers riverbeds with osiers. Adult flies are rare visitors at flowers. Larvae are inquillines in the nests of wasps and bees. (Figs 84-93).

**References:** Venturi 1952: Boll. Ist. Ent. Univ. Bologna 19: 147-170; Rohdendorf 1955: Ent. Obozr. 34: 360-373; 1971; Fliegen palaearkt. Reg. 11 (64 h), Lf. 285: 140-149; Pape 1986: Steenstrupia 12: 73-84; 1986: Stuttg. Beitr. Naturk. (A) 395: 1-8; 1987: Syst. Ent. 12: 69-78; 1987: Fauna ent. scand.19: 69-78.

#### Key to the species

1. ♂ ........ 2.
– ♀ ........ 8.

2. Anterior part of parafrontals greyish, slight silvery dusted, frontal vitta moderately broad, parallel-sided ........ 3.
– Anterior part of parafrontals silvery dusted, fore part of frontal vitta very narrow, nearly linear or sublinear ........ 4.

3. Middle tibia with one anteroventral bristle. Fore tarsus with elongate pd at its 1st-4th tarsomeres. Abdominal tergites I+II with mediomarginal bristles ........ *M. campestris* (Fall.)
– Middle tibia without av. Fore tarsus without long pd. Abdominal tergites I+II without mediomarginals ........ *M. grandii* Vent.

4. Fore tarsus without elongate specialized setae ........ 5.
– Fore tarsus with elongate specialized setae ........ 7.

5. Fore part of frontal vitta distinct to lunula, frontal bristle row continuous, uninterrupted ........ *M. tschernovae* Rohd. (Fig. 86)
– Fore part of frontal vitta linear, row of fr less distinct or weakly developed along parafrontals ........ 6.

6. Silvery dusted part of each parafrontal covering 0.6-0.7 of frons and with gradual transition to posterior, grey dusted part. Fore fr weakly developed ........ *M. roseri* Rd.
– Silvery dusted part of parafrontal covering anterior 0.4-0.5 of frons, abruptly demarcated from posterior greyish part. Fore fr absent ........ *M. argyrocephala* (Meig.) (Figs 88, 89)

7. 1st-4th tarsomeres of fore tarsus each with one apical anterior and posterior bristles. Silvery dusted part of parafrontal with a gradual transition to posterior grey dusted part ........ *M. italiana* Pape
– 2nd-4th tarsomeres of fore tarsus with numerous slightly elongate pd and p. Demarcation between anterior silvery part and posterior greyish part of parafrontal very distinct ........ *M. staegeri* Rd.

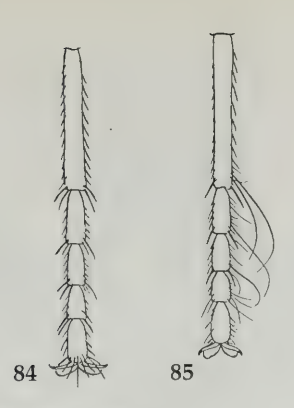



**Fig. 84.** *Metopia argyrocephala*. Male fore tarsus dorsally.
**Fig. 85.** *Metopia campestris*. Male fore tarsus, dorsally.

8. Mid tibia with one av ........................................................................ *M. campestris* (Fall.) (Fig. 90)
– Mid tibia without av ........................................................................................................... 9.
9. Abdominal tergites I+II without mediomarginals .................................................................. 10.
– Abdominal tergites I+II with a pair of mediomarginals ......................................................... 11.
10. Ocellar bristles as strong as reclinate orbitals ............................................................ *M. grandii* Vent.
– Ocellar bristles weaker than reclinate orbitals ................................................................ *M. roseri* Rd.
11. 1st tarsomere of fore tarsus as long as 2nd-4th tarsomeres together, 4th tarsomere longer than broad ..........................................................................................................................
.................. *M. argyrocephala* (Meig.), *M. tschernovae* Rohd., *M. staegeri* Rd. (Figs 84, 86, 88, 89, 93)
– 1st tarsomere of fore tarsus shorter than 2nd-4th tarsomeres together, 4th tarsomere as long as broad ................................................................................................................ *M. italiana* Pape

## *Metopia argyrocephala* (Meigen, 1824)

Syst. Beschr. 4: 372 *(Tachina)* (Fig. 89).

*leucocephala* Rossi, 1790. Fauna etrusca 2: 306 *(Musca)* (preocc. by Villers 1789).

### Description

♂. Frons at vertex 0.38-0.50, at narrowest part 0.34-0.40, at antennal base 0.43-0.52 head width (Fig. 88). Anterior 0.4-0.5 of parafrontal with silvery pollinosity abruptly demarcated from greyish pollinose posterior 0.5-0.6 of parafrontal. Parafacial and lunula silvery grey dusted, gena and metacephalon grey pollinose. Frontal vitta in posterior part triangular, black, anterior part linear. 3rd antennomere 5-8 times as long as 2nd, arista as long as 3rd antennomere or slightly shorter, bare, widened at basal 0.3-0.4. Antennae and palpi black. Parafacial at level of antennal base 0.4-0.7, narrow above, genae 0.11-0.17 eye height. Two regular rows of postorbital bristles, ocellar bristles hair-like, weaker than reclinate orbitals fr 5-8 pairs, only 2-3 anterior pairs proclinate, others reclinate, the last being shorter and finer than 2 pairs of long and strong exterior proclinate orbitals, 2 pairs reclinate interior orbitals as long and as thick as fr; silver fore part of parafrontals without bristles, but 1-2 small setae occasionally present. Parafrontals with numerous erect hairs posteriorly. Parafacial with usual row of bristles and with black setae on upper part, Vibrissal ridge with 1-2 pairs of short supravibrissal setae. Genae and metacephalon covered with black hairs and without pale setae (Figs 88, 89).

Thorax black, grey dusted, legs black, wings hyaline, basicosta and epaulet yellow. ac 1-2+1, short and hair-like; dc 2+3, strong; ia 0-1+1+2-3, only hind bristle long and strong; spl 1+1, propleuron bare.

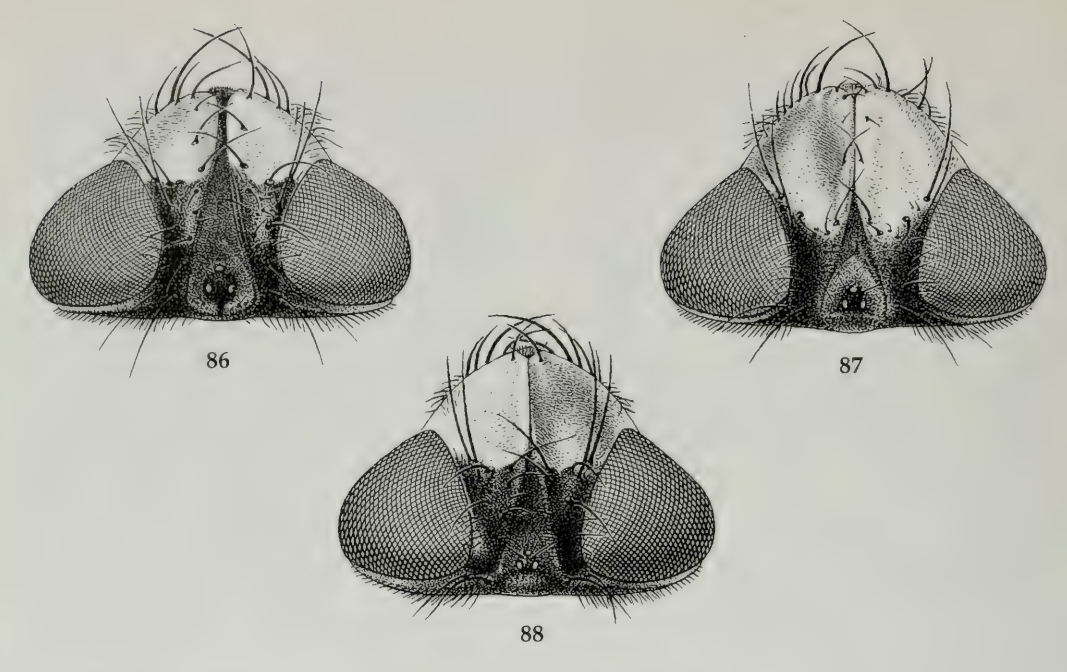



**Fig. 86.** *Metopia tschernovae.* Head, dorsal view (after Rohdendorf 1955).
**Fig. 87.** *Metopia roseri.* Head, dorsal view (after Rohdendorf 1955)
**Fig. 88.** *Metopia argyrocephala.* Head, dorsal view (after Rohdendorf 1955)

Scutellum with 3 pairs of long and strong marginals and with one pair of short, thick discals. Fore tarsus without specialized hairs (Fig. 84) Costal spine very short. $r_1$ bare, $r_{4-5}$ with 5-9 short hairs at basal 0.6-0.8 of its first section; ratio between 3rd and 5th sections of costa 1:1.4-2.5.

Abdominal tergites I+II-IV with long mediomarginals, tergite V with row of marginals, genitalia medium sized. Tergites I+II black, without pollinosity, other tergites grey dusted and each with three elongate triangular black spots. Genitalia lustrous black.

♀. Parafrontal without lustrous silvery spots, frontal vitta not linear in fore frontal part, at fore proclinate or 0.7-0.9 as wide as parafrontal, black and slightly grey dusted. Slight pruinescence on thorax and abdomen, more distinct than in ♂.

Body length 5-7.5 mm.

**Distribution:** Widely distributed in Holarctic, northern part of the Neotropical and Oriental regions. Flies are polytopic, living in forests, bushland and grassland. Larvae are inquilines in nests of various aculeate Hymenoptera: in Vespoidea – *Stenodynerus fundatiformis* Robertson (Krombein 1964); in Apidae – *Halictus pruinosus* Robertson (Allen 1926), *H. sexcinctus* F. (Baer 1921), *Lasioglossum* sp. (Kurahashi 1971); in Sphecoidea – *Ammophila campestris* Jur. (Baerends 1941), *A. communis* Gresson, *A. luctuosa* Smith (Krombein 1952), *A. pubescens* Curt. (Charykuliev, Myarceva 1964), *Argogorytes fargei* Schuck. (Fahlander 1954), *Bembix integra* Pz. (Séguy 1941a), *B. rostrata* L. (Baer 1921, Larsson 1986), *Cerceris arenaria* L. (Chevalier 1926), *C. halone* Banks (Buers 1978), *C. julii* Fabre (Séguy 1941a), *C. robertsoni* Fox. (Krombein 1950), *C. rubida* Jur., *C. rybyensis* L. (Séguy 1941a), *Chlorion* sp. (Pape 1987b), *Crabro peltarius* Schreber (Baer 1921), *Crossocercus elongatulus* v.d.Linden (Séguy 1941a), *Encopognathus* sp., *E. districtus* Lecq. (Verves 1979b), *Lyroda sabita* Say (Evans 1964). *Mellinus* sp. (Pape 1987b), *Oxybelus argentatus* Curt. (Séguy 1941a), *Philanthus triangulum* F. (Baer 1921, Charykuliev & Myarceva 1964), *Sphectus* sp. (Pape 1987b), *Sphex* sp. (Verves 1979b), *S. ruficinctus* Brullé (Lomholdt 1975), *S. sericeus fabricii* Dahl., *S. subtruncatus* Dahl (Verves 1979b), *Stenodynerus fundatiformis* Robertson (Krombein 1964), *Thyreopus* sp. (Kurahashi 1971).




**Fig. 89.** *Metopia argyrocephala* (after Venturi 1947).
**Fig. 90.** *Metopia campestris* (after Venturi 1947).

### *Metopia campestris* (Fallén, 1810)

Kon. svenska vetensk. Akad. Handl. (2) 31: 266 *(Tachina)* (Fig. 90).

**Description**

♂. Frons at vertex 0.42-0.50 and at antennal base 0.29-0.41 head width. Parafrontal, parafacial and gena silvery grey dusted, lunula and metacephalon pale grey pollinose. Frontal vitta broad, black, slightly grey dusted, at level of anterior proclinate or 2.5-3.3 of one parafrontal. Antennae and palpi

black, 3rd antennomere. 4.5-6.0 times as long as 2nd, arista with microscopic pubescence, inflated in basal ⅖-½, same length as 3rd antennomere. Parafacials at level of antennal base 0.24-0.33 and genae 0.13-0.20 eye heigth. One regular row of postorbital setae, ocellar setae about as strong as reclinate orbital setae. Parafrontals each with 2 reclinate and 2 proclinate orbital setae, and with numerous erect black setae. fr 7-9, not very strong. Parafacials with row of elongate bristles along facial ridge and several black hairs on upper part. 3-4 pairs of short supravibrissal setae. Gena and metacephalon covered with black hairs, without light setae.

Thorax black, grey dusted, longitudinal stripes of metacephalon bright, legs black, wings hyaline, basicosta and epaulet yellow or brownish. ac 2-3+2-3 thick, dc 2+3, strong, ia 0-1+2-3, only prescutellar pair straight. h 2-3, ph 1, npl 2, surface of notopleura covered with numerous erect strong marginals, and with 1-2 pairs of short and hair-like discals. Fore tarsus with long, forward curved setae on posterior surface of 1st-4th tarsomeres (Fig. 85). Middle tibia with 1 ad, 1 av, 2-3 pd bristles. Costal spine very short. $r_1$ bare, $r_{4+5}$ with a row of short black setae from base to ⅔ length of first section. Ratio between 3rd and 5th costal sections 1 : 1.2-1.5.

Abdominal tergites with mediomarginal setae, genitalia medium-sized. Tergites I+II lustrous black, others with grey pruinescence. Tergites III and IV with narrow medial longitudinal line and pair of triangular black spots, which fuse at hind margin of each tergite. Tergite V with lustrous black transverse band in hind 0.2-0.3. Genitalia lustrous black (Fig. 90).

♀. Like ♂, but with frons broader at antennal base (0.43-0.48 head width). Bristles and hairs shorter than in ♂, fore tarsus without specialized setae.

Body length 4.5-8.5 mm.

**Distribution:** Widespread in the Holarctic region and in the north of the Oriental (Kashmir) region. Flies prefer hygrophytic or mesophytic forests and bushland. Larvae are inquilines in various aculeate Hymenoptera: Pompiloidea – *Pompilus* sp. (Lundbeck 1927); Vespoidea – *Arachnospila trivialis* Dahl (Nielsen 1932), Apoidea – *Andrena* sp., Sphecoidea – *Ammophila campestris* Latr. (Nielsen 1932), *Cerceris halone* Banks (Byers 1978), *Crabro cribrellifer* Pack. (Wcislo 1984), *Gorytes laticinctus* Lep. (Lomholdt 1975), *Larropsis* sp. (Pape 1987b), *Sphex rufocinctus* Brullé (Lomholdt 1975).

## *Metopia grandii* Venturi, 1953

Boll. Ist. ent. Bologna 19: 166.

### Description

♂. Frons at vertex 0.4-0.43 and at antennal base 0.36-0.41 head width. Parafrontal, Parafacials and gena pale grey dusted. Frontal vitta broad, at fore proclinate or 1.3-2 times as broad as parafrontal, widening 2-3 times towards head tip. 3rd antennomere 4-5 times as long as 2nd, arista as long as 3rd antennomere, bare, inflated in basal 0.3-0.4, antennae and palpi black. Parafacial at level of antennal base 0.25-0.3 and genae 0.1-0.18 eye height. 2 regular rows of postorbital bristles, ocellar bristles long and strong, about as strong as reclinate orbital bristles. 2 pairs of proclinate and 2 pairs of reclinate orbitals, the latter being long and thick. fr 7-9, rather thin, few black hairs on parafrontals short. Parafacials with usual row of bristles, without other setae. Gena and metacephalon covered with black hairs.

Thorax grey pollinose, mesonotum with 4 black longitudinal stripes before and with 3 stripes behind suture, legs black, wings hyaline, basicosta and epaulet yellow. ac 2-3+1, very small, dc 2+3, strong, ia 0-1+2-3, only posterior pair long and strong, npl 2, in addition to these bristles surface of notopleura covered with few small setae, spl 1+1, propleura bare. Scutellum with 3 pairs of strong and elongate marginals and with 1-2 pairs of short discals. Fore tarsus (Fig. 91) with some elongate hairs at posterior surface. $t_2$ without av. Costal spine weak, $r_1$ bare, $r_{4+5}$ with row of black hairs from base to the end of its first section, ratio between sections 3 and 5 equals 1 : 1.2-2.0.

Abdominal tergites I+II without mediomarginals, tergite III with one pair of mediomarginals, tergites IV and V with row of marginals. Genitalia medium-sized. Abdomen grey or yellowish grey pollinose. Tergites I+II and genitalia lustrous black, tergites III and IV each with 3 longitudinal black spots fusing at posterior margin. Tergite V with black band in hind 0.4-0.5.

♀. Like ♂, but fore tarsus without specialized setae.

Body length 4.5-7 mm.

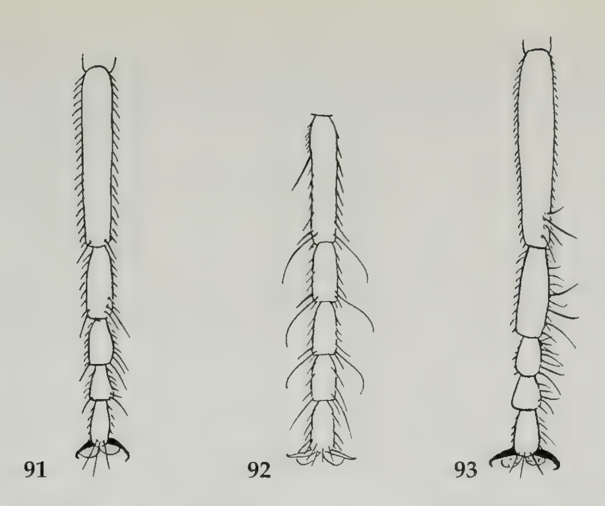



**Fig. 91.** *Metopia grandii.* Male fore tarsus.
**Fig. 92.** *Metopia italiana.* Male fore tarsus.
**Fig. 93.** *Metopia staegeri.* Male fore tarsus.

**Distribution:** A rare species occurring in Italy, Yugoslavia, Denmark, Sweden, Finland, Ukraine (Transcarpathia), Russia (Jaroslavl, Altaj, Čita, Amur, Primorje) and Japan. Flies prefer hydrophytic bushy localities; feeding habits unknown.

### *Metopia italiana* Pape, 1985

Ent. scand. 16: 214.

*staegeri* auct. nec Rondani, 1859.
*argentata* sensu Verves, 1986a nec Macquart, 1850.

**Description**

♂. Frons at vertex 0.39-0.43, in narrowest part 0.37-0.39, and at antennal base 0.46-0.48 head width. Posterior part of frontal vitta triangulate with grey pollinosity, anterior part entirely obliterated by contiguous frontal plates. Posterior 0.3-0.4 of parafrontals grey pollinose, anterior 0.6-0.7 lustrous silvery dusted, silvery part with gradual transition towards posterior greyish part. Parafacials silvery dusted, lunula, gena and metacephalon pale grey pollinose. Antenna and palpi black. 3rd antennomere 5-6 times longer than 2nd, arista as long as 3rd antennomere, inflated at basal 0.3-0.4. Profrons distictly protruding, parafacial at level of antennal base 0.35-0.4 and gena 0.09-0.11 eye height. Two regular rows of postorbitals, ocellar bristles shorter and more subtle than in orbitals. Interior and exterior orbitals well developed. fr 5-7, not very strong, fore part of frons sometimes with 1-2 pairs of frontal bristles. 2 pairs of proclinate and 2-4 pairs of reclinate orbital bristles, and several erect hairs in parafrontal area. Parafacials with few hairs in addition to the usual row of bristles along interior parafacial margin. Gena and metacephalon with numerous black hairs.

Thorax grey pollinose with olive-brown tinge medially. Metacephalon with 4 presutural and 3 postsutural longitudinal black stripes. Legs black, wings hyaline, basicosta and epaulet yellow. ac 0(2-3)+1, short, dc 2+3, strong, ia 1+2, h 2-3, ph 1, npl 2, notopleura in addition to long bristles with a few small setae, spl 1+1, propleuron bare. Scutellum with 3 pairs of long and strong marginals and with 1-2 pairs of shorter discals. Fore tarsus (Fig. 92) with two long apical setae: anterior and posterior on each 1st-4th tarsomeres. 1st tarsomere as long as combined length of 2nd and 3rd. Middle tibia without av bristles. Costal spine very short, $r_1$ bare, ratio between costal section 3 and 5 corresponds 1 : 1.5-1.8.

Abdominal tergites I+II with pair of mediomarginals, tergite V with row of marginals, genitalia medium-sized. Abdomen silverish grey pollinose, tergite I+II and genitalia brownish black, poorly pollinose. Tergites III and IV with 3 longitudinal black spots, pattern of dark lateral spots changes with incidence of light. Tergite V with lustrous black band in hind 0.3-0.4.

♀ (after Pape 1985). Frontal vitta at vertex twice as broad as fronto-orbital plate, width at lunula twice as broad at vertex. Frontal vitta on lunula reddish brown to dark brown, on vertex black with greyish pollinosity. Fronto-orbital plates less hairy than in ♂, 9-11 pairs of frontals. 2 proclinate orbitals, 2-3 reclinate orbitals. First tarsomere of fore tarsus as long as combined length of 2nd and 3rd tarsomeres. Tarsomeres of fore tarsus slightly broader than in ♂ and with gustatory hairs of normal length. Abdomen grey pollinose, only slightly changing with incidence of light and with poorly developed pattern of darker lateral spots and medial stripe. Marginals of tergites I+II poorly developed.

Body length 4.5-6.5 mm.

**Distribution:** France, Austria, Italy, Poland, Ukraine and Russia (surroundings of Perm). Flies frequent damp bushy localities. Larvae are inquilines in nests of Sphecoidea: *Bembicinus tridens* F. (Séguy 1941a), *Oxybelus victor* Lep. (Grandi 1959) and probably *Alysson spinosus* Pz. (Draber-Mońko 1973).

### *Metopia roseri* Rondani, 1859

Dipt. ital. prodr. 3: 210.

*instruens* Walker, 1859. Proc. Linn. Soc. London, Zool. 4: 129.
*stackelbergi* Rohdendorf, 1955. Ent. Obozr. 34: 369.

#### Description

♂. Frons at vertex 0.38-0.44, at the narrowest part 0.34-0.38, and at antennal base 0.41-0.5 head width (Fig. 87). Posterior part of frontal vitta triangulate, grey dusted, anterior part entirely obliterated by contiguous frontal plates. Posterior 0.3-0.4 of parafrontals grey pollinose, anterior 0.6-0.7 with lustrous silvery pollinosity; silvery part gradually transitive to posterior greyish part. Parafacial slightly silver dusted, lunula, gena and metacephalon grey pollinose. Antennae and palpi black, 3rd antennomere 4.5-6.5 times as long as 2nd, arista distinctly shorter than 3rd antennomere, inflated in basal 0.3-0.5. Profrons rather protruding, parafacial at level of antennal base 0.34-0.38 and gena 0.1-0.13 eye height. 2 regular rows of postorbitals, interior and exterior verticals well developed and strong. Ocellars delicate, shorter than orbitals. Hind frontal delicate, 4-5 paired, fore frontals (along contiguous margin of parafrontals) strong, 4-9 paired. Proclinate orbitals 2 pairs, and reclinate orbitals 2-4 pairs, parafrontal in posterior part with several erect black hairs in addition to or and fr bristles. Parafacial with usual row of bristles along interior margin close to facial ridge, and with some black hairs on upper part. Vibrissae very strong, with 2-3 short supravibrissal setae. Genae and metacephalon covered with black hairs (Fig. 87).

Thorax grey pollinose, mesonotum with 4 black presutural and 3 postsutural longitudinal stripes, legs black, wings hyaline, basicosta and epaulet yellow to pale brown. ac 0 (occasionally 1-3)+1, very weak and indistinct. dc 2+3, strong; ia 1+3, only hind bristle strong, h 2-3, ph 1, npl 2, notopleura with few hairs (5-10) in addition to usual bristles, spl 1+1, propleuron bare. Scutellum without specialized setae. 1st tarsomere as long as combined 2nd-5th tarsomeres or slightly shorter. $t_2$ without av. Costal spine unclear, $r_1$ bare, $r_{4+5}$ with a row of black setae from base to 0.6-0.8 of first section length. Ratio between 3rd and 5th costal sections 1 : 1.2-1.8. Abdominal tergites I+II and III with 1-2 pairs of strong mediomarginals, tergites IV and V with row of marginal bristles, genitalia medium-sized. Abdomen grey, or yellowish grey dusted. Tergites I+II and genitalia lustrous black. Tergites III and IV with well developed paired lateral spots and poorly developed medial spot. Tergite V with lustrous black band in its posterior 0.4-0.5.

♀. Frontal vitta broad, 1.5-2.2 times wider towards apex, at level of fore proclinate or bristle 0.5-0.8 times as broad as one parafrontal, black and weakly dusted, parafacials and parafrontals completely silvery grey dusted, parafacial at level of antennal base 0.3-0.34 eye heigth. Medial abdominal spots well developed. Abdominal tergites I+II without medial marginals.

Body length 4.5-7.5 mm.

**Distribution:** Southern and central Europe, north to southern Finland, absent from British Isles; southern Siberia, Far East, Mongolia, Tibet, Oriental region and Celebes. Flies frequent sandy areas with willows on river banks. Larvae dewelop in nests of the pompilid wasp *Batazonus lacerticida* Pall. (Rohdendorf & Verves 1980).

### *Metopia staegeri* Rondani, 1859

Dipt. Ital. Prodr. 3: 210.

*rondaniana* Venturi, 1953. Boll. Ist. Ent. Univ. Bologna 19: 163.

**Description**

♂. Frons at vertex 0.39-0.45, at narrowest part 0.36-0.39, and at antennal base 0.42-0.51 head width. Anterior 0.4-0.5 of parafrontalia with lustrous silvery pollinosity abruptly demarcated from grey dusted posterior 0.5-0.6 part of parafrontals. Posterior part of frontal vitta triangular with grey pollinosity, anterior part linear, entirely obliterated by contiguous parafrontals. Parafacials lustrous silvery dusted, lunula, gena and metacephalon pale grey pollinose. Antennae and palpi black. 3rd antennomere 4.5-7.5 times as long as 2nd, arista bare or micropubescent, inflated in basal 0.3-0.4. Profrons protruding, parafacial at level of antennal base 0.3-0.52, gena 0.09-0.14 eye height. 2 regular rows of postorbitals, vte and vti well developed, ocellar bristles shorter and finer than orbitals. Posterior frontals delicate, 5-8 pairs, anterior fr more or less distinct, 1-3 pairs (in fore part of frontale); proclinate or 2 pairs, reclinate or 2-4 pairs with some fine hairs between them. Parafacial plates with usual vertical row of bristles and some black hairs on upper part, genae and metacephalon with numerous black hairs.

Thorax grey dusted, mesonotum with 4 presutural and 3 postsutural elongate black spots. Legs black, wings hyaline, basicosta and epaulet yellow. ac 0+1, very short and fine; dc 2+3, strong. ia 0-1+2-3, only hind pair strong; notopleura with 2 strong bristles and with numerous (5-12) short erect setae; spl 1+1, propleuron bare. Scutellum with 3 pairs of strong marginals and with 1-2 pairs of fine discals. Fore tarsus (Fig. 93) with numerous erect hairs on apical part of 1st tarsomere and on all 2nd-4th tarsomeres, these hairs situated posterodorsally. 1st tarsomere of fore tarsus as long as 2nd-5th tarsomeres. Costal spine small, $r_1$ bare, $r_{4+5}$ with a row of setae at basal 0.5-0.7 of its 1st section. Ratio between costal sections 3 and 5, 1 : 1.2-2.0.

Abdominal tergites I+II-IV with pair of medial marginal bristles, tergite V with row of marginal bristles. Genitalia medium-sized. Abdomen grey or yellowish grey dusted, tergites I+II and genitalia lustrous black. Tergites III and IV with 3 well developed triangular spots, tergite V with lustrous black band at apical 0.4-0.5.

Body length 5.5-7.5 mm. ♀ unknown.

**Distribution:** The species is widely distributed in forest and shrub habitats of Europe and western Siberia. Larval bionomy unknown.

### *Metopia tshernovae* Rohdendorf, 1955

Ent. Obozr. 34: 368.

**Description**

♂. Frons at vertex 0.43-0.46, in narrowest part 0.39-0.44, and at antennal base 0.47-0.55 head width (Fig. 86). Frontal vitta grey dusted, posterior part broad and triangulate, but anterior part of parafrontals subcontiguous, so that fore part of frontal vitta is narrow. Anterior 0.4-0.5 of parafrontal with silvery pollinosity which is abruptly demarcated from greyish pollinose posterior 0.5-0.6 of parafrontal. Parafacial silvery dusted, other head parts slightly grey pollinose. 3rd antennomere 5-7 times as long as 2nd, arista micropubescent, inflated in basal 0.3-0.5. Antennae and palpi black. Parafacial at level of antennal base 0.4-0.56 and gena 0.09-0.15 eye height. Two regular rows of postorbitals, ocellar bristles hair-like, weaker than orbital bristles. fr 9-11 pairs. Row of frontals almost complete and symmetrical, anterior 4-5 pairs strong, others hair-like. Two pairs of proclinate and 2-3 pairs of

reclinate orbitals with some erect black hairs between them. Parafacials with usual vertical row of subvibrissal bristles and with black setae. Genae and metacephalon covered with black hairs. (Fig. 86).

Thorax grey dusted, netacephalon with 4 presutural and 3 postsutural longitudinal black stripes. Legs black, wings hyaline. Basicosta and epaulet yellow. ac 0(1-2)+1, hair-like; dc 2+3, strong; ia 0-1+2-3, only hind pair long and strong, h 2-3, ph 1, npl 2, surface of notopleura with several erect black setae in addition to usual bristles, spl 1+1, propleuron bare. Scutellum with 3 pairs of long, strong marginals, discals indistinct. Fore tarsus without specialized setae, $t_2$ without av. Costal spine absent or very small, $r_1$ bare, $r_{4+5}$ with several setae at basal 0.5-0.8 of its first section. Ratio of costal sections 3 and 5 as 1 : 1.4-1.7.

Abdominal tergites I+II-IV each with one pair of mediomarginal setae, tergite V with row of marginal bristles. Genitalia medium-sized. Abdominal tergites I+II and genitalia lustrous black, other tergites grey dusted. Tergites III and IV with three elongate triangular black spots fusing more or less at posterior margin. Tergite V with trilobed posterior band at apical 0.4-0.6.

Body length 6-7.5 mm.

♀ unknown.

**Distribution:** A rather rare species known from Poland, Denmark, Finland, Sweden, Norway, Russia (St. Petersbourgh district), Ukraine, Kazakchstan, Siberia (Čhita, Irkutsk), Mongolia and the Oriental region (Thailand). Life history unknown.

## Subtribe Mesomelaenina Verves, 1989

Japan J. Med. Sci. Biol. 42: 19.

Medium-sized, brightly coloured flies. The single known species of this monobasic subtribe shows conspicuous autapomorphic characters such as the presence of dense hairs on the parafacials, long costal wing spine, elongate and apically widened acrophallus and ancestral sexual dimorphism. Frontal vitta in ♂ somewhat narrowed ventrally; longitudinal medial black stripe on thorax and abdomen absent in ♀, abdomen of ♀ with three dorsal spots on each tergite.

## Genus *Mesomelaena* Rondani, 1859

Dipt. Ital. Prodr. 3: 206.
**Type species:** *Mesomelaena loewi* Rondani, 1959 (ibidem).

*Winnertzia* Schiner, 1861. Wien. entom. Nachr. 5: 142.
**Type species:** *Metopia mesomelaena* Loew, 1848.

Frontalia broad, at antennal base broader than at vertex, parafacial broad, gena narrow, lower part of head shortened. 3rd antennomere 3-4 times longer than 2nd, arista bare, inflated in basal ⅓-¼. Propleuron bare, ac 0+1, dc 2+3, strong, spl 1+1. Scutellum with 3 pairs of strong marginal bristles and 1-2 pairs of shorter discals. Claws in ♂ short. $R_5$ narrow, open, $r_1$ bare, $r_{4+5}$ with several setae at base. Abdomen conical. The single known species is widely distributed in Eurasia.

**References:** Rohdendorf 1975: Fliegen palaearkt. Reg. 11 (64 h.), Lf. 311: 185-187.

### *Mesomelaena mesomelaena* (Loew, 1848)

Stett. ent. Z. 9: 377 *(Metopia)*.

*Mesomelaena loewi* Rondani, 1859. Dipt. Ital. Prodr. 3: 206.

**Description**

♂. Frons at vertex 0.33-0.39 and at antennal base 0.35-0.42 head width. Parafrontals and parafacials silvery grey dusted; lunula, gena and metacephalon black, slightly grey pollinose. Hind part of frontal vitta broad, grey dusted, fore part very narrow (0.2 width of one parafrontal), black. Antennae and

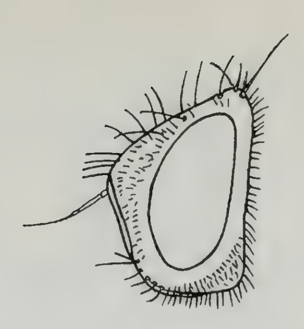


**Fig. 94.** *Mesomelaena mesomelaena*. Male head profile (after Rohdendorf 1925).

palpi black, proboscis short. Parafacial at antennal base 0.25-0.30 and gena 0.14-0.17 eye height. One regular row of postorbitals; vte well developed, ocellar bristles not very strong, or 1+2, fr 6-9, strong, parafrontals and parafacials covered by dense erect black setae. Vibrissal bristles strong, disposed at mouth margin. Gena and metacepahlon with numerous black hairs (Fig. 94).

Thorax black, silvery grey dusted, mesonotum with broad black, medial, elongate stripe; scutellum lustrous black, with a pair of silvery dusted spots between apical and lateral marginal bristles. Legs black, wings hyaline, basicosta bright brown to yellow, epaulet black to brown; ia 0+2, only hind pair long and strong, npl 2, notopleural surface with several (6-10) erect setae; fore tarsus with elongate apical av and pv setae on 1st-4th tarsomeres; fore tibia with one long pv; mid tibia with one ad; m-cu slightly curved, ratio hetween 3rd and 5th costal sections 1 : 1.2-1.4. Abdominal tergites I+II without strong mediomarginal bristles, tergite III sometimes with pair of short bristles, tergites IV and V with erect marginal bristles. Genitalia small. Abdomen silvery grey dusted, lateral parts of tergites reddish to yellowish, translucent. Tergites I+II dorsally lustrous black, tergites III-V with lustrous black spots broader anteriorly than posteriorly.

♀. Frons broader than in ♂, at vertex 0.44-0.48 and at antennal base 0.46-0.52 head width. Frontal vitta broader, black, slightly grey dusted. Mesonotum pale grey, without black spots. Basicosta and epaulet yellow. Tergites III-V with 3 black spots, medial spot longitudinal, lateral spots rounded.

Body length 4-8.5 mm.

**Distribution:** Widely distributed in central and southern Europe, Transcaucasia, southern Siberia, central Asia, Mongolia and Northern China. Flies frequent sandy habitats. Larvae were bred from a head of dead dzeiran antelope *(Gazella subgutturosa)* (Rohdendorf & Verves 1980), but this is obviously only one of possible trophic strategies.

## Subtribe Phrosinellina Verves, 1989

Japan J. Med. Sci. & Biol. 42: 119.

This tribe comprises two genera, viz. the Nearctic *Gymnoprosopa* Towns. and the Holarctic *Phrosinella* Rob.-Desv. with the subgenera *Phrosinella* s. str., *Asiometopia* Rohd., *Caspiomyia* Rohd., and *Euhilarella* Towns. with some 30 species. The following are the most important apomorphic characters of this subtribe: arista inflated proximally at about 0.6-0.8 of its length; frontale very broad; 3rd antennal segment elongate, precutellar ac reduced, abdominal spots partly fused.

Species are psammophilic and larvae are inquilines in nests of Sphecoidea.

## Genus *Phrosinella* Robineau-Desvoidy, 1863

Hist. Nat. 2: 82.
**Type species:** *Tachina nasuta* Meigen, 1824.

Small or medium-sized (3-10 mm) flies with bright coloration. Frons very broad (0.45-0.55 head width), frontal vitta broad, gena narrow or 1+2, strong, ocellar bristles strong, vibrissal bristles strong, situated



**Fig. 95.** *Phrosinella nasuta* (after Venturi 1974).

at mouth margin. Proboscis short. dc 2+3, ac 0+1, spl 1+1; propleuron bare, costal spine present, elongate. Claws in ♂ short, fore tarsus in ♂♂ of several species with specialized setae. Abdomen with chequered pattern of black spots and bands. Genitalia small. More than 20 species occur in sandy areas of Europe, northern Asia and America (subgenus *Euhilarella*).

References for *Phrosinella* s. str.: Rohdendorf 1971, Ent. Obozr. 50: 446-453; Rohdendorf 1971, Fliegen palaearkt. Reg. (64 h), Lf. 11, 285: 132-140.

### *Phrosinella (Phrosinella) nasuta* (Meigen, 1824)

Syst. Beschr. 4: 374 *(Tachina)*.

#### Description

♂. Frons at vertex 0.48-0.52 and at antennal base 0.44-0.48 head width. Head grey dusted, yellowish at vertex; frontal vitta blackish, at fore or 1.6-2 times as wide as one parafrontal and 1.3-1.5 times wider posteriorly. Antenna black, palpi yellow to pale brown, 3rd antennomere 3.5-4.5 times longer than 2nd, arista inflated in basal 0.6-0.7, moderately shorter than 3rd antennomere. Parafacial at antennal base 0.2-0.33 and gena 0.12-0.15 eye height. Two regular rows of postorbitals, vte well developed, 9-12 pairs of fr, parafrontals and parafacials covered with short black setae. Fore part of gena with black bristles, hind part of gena and lower part of metacephalon with numerous erect yellowish white hairs. Pleura light grey dusted, mesonotum yellowish grey pollinose, longitudinal black stripes of mesonotum indistinct. Legs black, grey dusted. Wings hyaline, basicosta and epaulet pale brown to yellowish. ac 0+0-1, ia 0+2-3, h 2, ph 1, npl 2 long and 3-7 short, scutellum with 3 pairs of marginal and 1-2 pairs of discal bristles. Fore tarsus without long setae, $t_2$ with one av. $r_1$ bare $r_{4+5}$ with setae from base up to r-m. Ratio between 3rd and 5th sections of costa equals 1:1.2-1.6, m-cu strongly curved.

Abdomen conical, all tergites with strong mediomarginals, genitalia small. Abdomen silvery dusted. Tergites I+II lustrous black, tergites III-V lustrous black each with a silver dusted band in its 0.3-0.4. Genitalia lustrous black (Fig. 95).

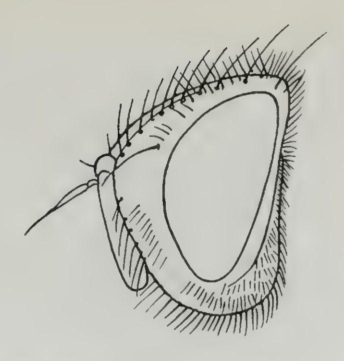


**Fig. 96.** *Sphenometopa fastuosa*. Male head profile.

♂. Differs from ♂ by broader frontalia (0.48-0.56 head width), shorter 3rd antennomere (2.5-3.5 times longer than 2nd segment). Abdominal tergites I+II silvery dusted at base.

Body length 3.5-6.5 mm.

**Distribution:** Widely distributed in Central and South Europe, Transcaucasia, southern Siberia, Mongolia and North Africa (Libya, Algeria). Flies are psammophilic, larvae develop in nests of Sphecoidea: *Nitela spinolae* Latr., *Oxybelus quadrinotatus* Say (Séguy 1941a).

### Subtribe Sphenometopiina Verves, 1989

Japan J. Med. Sci. & Biol. 42: 119-120.

This subtribe comprises a single genus – *Sphenometopa* Towns. (*Saharaba* Rohd. is considered to be a subgenus of *Sphenometopa*). *Sphenometopa* comprises about 50 species distributed in the Holarctic region, the majority being known from southern parts of the Palaearctic. The following apomorphies characterize this subtribe: a row of long vibrissal bristles and a special kind of sexual dimorphism: Frons in ♂ usually silvery or goldish dusted, wings often pointed, fore tarsus mostly with long setae, ♂ abdomen partly lustrous black, but ♀ abdominal tergites each with three dorsal black spots. The flies are found on stony banks of mountain streams. Larval habits were unknown until a nearctic species was reared from a nest of the sphecoid wasp *Podalonia occidentalis* Murray (Evans 1987).

### Genus *Sphenometopa* Townsend, 1902

Smiths. misc. Collns. 51: 64.
**Type species:** *Araba nebulosa* Coquillett, 1908.

*Eumetopiella* Verves, 1986. Catal. palaearkt. Dipt. 12: 89 (error: not *Eumetopiella* Hendel, 1907).

Medium-sized to small (3-8 mm) brightly coloured flies. Frons and facial very broad, frontal vitta broad, distinctly widened towards vertex, parafacial broad, haired, with row of long vibrissal bristles. 3rd antennomere elongate, arista inflated in basal 0.6-0.8; or and fr strong, parafrontal with several or with numerous erect black hairs in addition to usual bristles. Eyes bare, lower head margin shortened, proboscis short. dc 2+3, strong, as 0-2+0-3, spl 1+1, propleura bare. Scutellum with three pairs of marginals. $t_2$ with 1-3 ad. $R_5$ open or closed, $r_1$ bare, m-cu curved or straight, costal spine short or absent. Abdominal bands and spots rather different in the individual species.

**References:** Rohdendorf 1967, Ent. Obozr. 46: 450-567; Rohdendorf 1971, Fliegen palaearkt. Reg. 11 (64 h), Lf. 285: 125-176; Rohdendorf 1975, ibid. Lf. 311: 177-185; Pape 1991: Nouv. Rev. Ent. 7: 435-442.



**Fig. 97.** *Sphenometopa fastuosa* (after Venturi 1947).

## Subgenus *Euaraba* Townsend, 1915

Proc. Biol. Soc. Wash. 28: 20.
**Type species:** *Araba tergata* Coquillett, 1895.

Wing with m-cu curved, $t_2$ with one ad, ac 0+0-2, 1st tarsomere of fore tarsus in ♂ not inflated, body silvery or grey dusted, head bright. More than 25 species are distributed in the Holarctic an Palaeotropical regions.

## *Sphenometopa (Euaraba) fastuosa* (Meigen, 1824)

Syst. Beschr. 4: 370 *(Tachina)*.

### Description

♂. Frons 0.34-0.43 head width. Frontal and facial silvery dusted, lunula and gena yellowish grey pollinose. Frontal vitta 1.8-2.5 times broader posteriorly. Antenna and palpus black, 3rd antennomere 3.5-5.5 times as long as 2nd. Parafacial (Fig. 97) at level of antennal base 0.24-0.31 and gena 0.16-0.18 eye height. 2-3 regular rows of postorbitals, ocellars fine, or 0+2-3, strong; fr 9-13. Parafrontals and parafacials with short black setae. Gena and metacephalon with numerous black hairs.

Thorax lustrous black, pleurae with fine grey pruinescence, legs black. Basicosta yellow to brown, epaulet brown to black. Wings hyaline with pattern. A brown spot situated in apical part of cell SC, it crosses cell $R_1$ and terminates in fore part of cell $R_{3+5}$; a small yellow spot is situated near angle of medial vein. ac 0+0-1, ia 0+1-2; scutellum with numerous erect hairs on upper surface, discals absent. Fore tarsus without elongate hairs or bristles. Costal spine absent. Ratio between length of 3rd and 5th costal sections 1 : 2-2.5.

Abdominal tergites I+II without marginal bristles, tergites III and IV with pair of erect mediomarginal bristles, tergite V with row of mediomarginals. Genitalia medium-sized. Tergites I+II and III lustrous black, tergite III with small grey spot in fore part. Tergites IV and V partly grey dusted. Tergite IV with 3 black spots in hind (0.3-0.4) part, occasionally these spots are reduced. Tergite V with lustrous black band in posterior 0.4-0.6. Genitalia lustrous black.

♀. Frontal vitta 1.3-1.5 widening backwards and yellowish dusted. 3rd antennomere 3-3.5 longer than 2nd, oc 1+2. 2nd-4th fore tarsus tarsomeres inflated. Thorax pale grey dusted, mesonotal longitudinal stripes very delicate. Wings without pattern. Abdomen yellowish grey dusted, black spotted. Spots on tergites I+ I indistinct, tergites III and IV each with 3 black spots in caudal 0.5-0.6. Tergite V with lustrous black band in caudal 0.5-0.7 (Fig. 97).

Body length 4-7 mm.

**Distribution:** Widely distributed in mountains of central and southern Europe, Caucasus, central Asia (Kopet Dagh), Yemen, Egypt, Kenya and India.

## Subfamily Paramacronychiinae

Brauer & Bergenstamm, 1889, Denkschr. Akad. Wiss. Wien 56: 76.

Agriinae Rohdendorf, 1937, Fauna SSSR 19 (1): 46.

Grey or brightly coloured flies of varied size (3-22 mm). Sexual dimorphism developed in various degrees. Head proportions rather different. Hind coxa bare, claws in both sexes elongate (in European species). Middle tibia with 2-3 strong ad. Tergite VI of ♂ genital segment reduced, occasionally present *(Eurychaeta)*. Tergosternites VII+VIII with row or bunch of discal bristles. Abdominal tergites VII-VIII of ♀ partly reduced or separated along mid-line, intersegmental membrane narrow. First instar larva with great maxillae, clypeal arch absent or poorly developed.

This subfamily comprises 5 tribes with 24 genera including more than 100 species, most occur in the Palaearctic region, others in North and Central America; individual species occur in the Afrotropical and Oriental regions, Hawaii and in Micronesia. Larvae are thoroughly necrophagous, some species are true predators or parasitoids of various invertebrates (snails, insects) and vertebrates (amphibians, reptiles, mammals).

**References:** Kurahashi 1975: Kontyu 43: 202-213; Verves 1980: Zool. J. 59: 1476-1482; Verves 1982: Fliegen palaearkt. Reg. 11 (64 h), Lf. 327: 235-296; Verves 1985: ibid. Lf. 330: 297-348; Verves 1990: Vest. Zool. 4: 24-31; Verves & Kulikova 1986: Zool. J. 65: 1324-1331; Fan 1992 (Ed.): Key to the common flies of China: 611-622.

### Key to the tribes, subtribes and genera of Paramacronychiinae

1. Propleuron hairy, frons in both sexes about 0.3 width of head. $R_5$ open, abdomen with chequered pattern, hind margin of abdominal tergites lustrous black. Tergite VI in ♀ bilobate. Tergite VI in ♂ present, belt-like, basiphallus and distiphallus fused but mobile, distiphallus divided into basal and apical parts. Palpi yellow .......................... (tribe Helicoboscini Verves, genus *Eurychaeta* V. B.)
– Propleuron bare .......................................................................... (tribe Paramacronychiini B. B.) 2.

2. Frons in both sexes wider than eye, parafacials bare or with fine setae, but without stronger bristles. Surstyli in ♂ widened apically, epiphallus reduced. Abdomen with black spots or bands ............. ..................................................................................................... (subtribe Wohlfahrtiina Rohd.) 3.
– Frons of ♂ narrower than eye, parafacial bristles strong ..................................................................... 4.

3. Parafacials hairy. Frons in ♂ with 2 pairs of proclinate or. Palpi black ....................... *Sarcophila* Rd.
– Lower part of parafacials bare. Frons in ♂ without proclinate or, less often with one pair of fine bristles. Palpi black or brown ........................................................................................ *Wohlfahrtia* B. B.

4. Abdomen black and almost without pollinosity. Basiphallus and distiphallus fused but mobile, ventral arms petiolate, paraphallus membranous, elongate. Tergite VI in ♀ narrow, both pairs of stigmata situated in membrane ........ (subtribe Nyctiina End.) *Nyctia* R.-D.
– Abdomen partly with slight, dense pollinosity. Aedeagus complete ........ 5.

5. Gena at least 0.5 of eye height. 3rd antennomere 1-1.4 × times length of 2nd. Arista bare ........ (subtribe Paramacronychiina B. B.) genus *Paramacronychia* B. B.
– Gena at most 0.5 eye height. 3rd antennomere not less than 1.5 times length of 2nd ........ (subtribe Agriina End.) 6.

6. Arista bare or with short cilia, cilia distinctly shorter than diameter of arista. Hypophallus reduced ........ *Brachicoma* Rd.
– Arista plumose, hairs distinctly longer than greatest diameter of arista ........ 7.

7. Palpus black, costal spine not differentiated ........ *Agria* R.-D.
– Palpus yellow, costal spine well developed ........ *Angiometopa* B. B.

### Tribe Helicoboscini Verves, 1980

Frons in both sexes equals about 0.3 head width. Frons and oral margin protruding; parafacial with long bristles. Propleuron hairy. Body bristles very straight. ♂ abdominal tergite VI present. Epiphallus well developed. Basiphallus and distiphallus fused but mobile, distiphallus divided into basal and apical part. Abdominal tergite VI bilobate in ♀. One palaearctic species, parasitic on snails, and one monobasic genus in Himalaya.

**References:** Verves 1982, Fliegen palaearkt. Reg. 11 (64 h), Lf. 327: 258-262; Rognes 1986, Ent. scand. 17: 75-92.

### Genus *Eurychaeta* Brauer & Bergenstamm, 1891

Denkschr. Akad. Wiss. Wien 58: 267.
**Type species:** *Theria palpalis* Robineau-Desvoidy, 1830.

*Theria* Robineau-Desvoidy, 1830 [nom. preocc., a junior homonym of *Theria* Hübner, 1816 (Lepidoptera)]. Essai Myod. 337.
*Helicobosca* Bezzi, 1906. Z. syst. Hymenopt. Dipt. 6: 49 (new name for *Theria* R.-D.).

Dark grey flies, medium-sized or large (9-16 mm). Head dark grey silvery white dusted, frontal vitta paralle-sided, 1.2-1.6 times wider than one parafrontal. 3rd antennomere 2-3 times longer than 2nd, arista with long hairs, antenna black, palpus yellow. Parafacial at level of antennal base 0.2-0.25 and gena 0.22-0.32 eye height. One row of postorbital setae. Ocellar setae strong, fr 4-9, parafrontal with numerous black hairs, gena and metacephalon with black setae. Thorax silvery grey dusted, mesonotum with 2 longitudinal dark stripes, legs black, wings hyaline, basicosta and epaulet black. Thoracic bristles very strong. ac 3-5+3-4; dc 3-4+4, h 3-6, ph 1-2, ia 1-3, spl 3+1; $f_3$ in ♂ without ctenidium, $t_2$ with 2-4 ad. $R_5$ open, $r_1$ bare, $r_{4+5}$ with some setae basally, m-cu sigmoid; ratio between 3rd and 5th costal sections 1 : 0.6-0.9. Abdominal tergites I+II without marginals, tergite III with 1-3 pairs of mediomarginals. Abdomen with chequered pattern, ultimate tergite border deep black lustrous, genitalia black. Cercus hook-formed, surstyli elongate, epiphallus well developed. ♀ abdominal tergite VI and VII each comprise 2 plates, tergite VIII membraneous, without setae. 3 species occur in the western part of the Palaearctic region. Flies frequent humid forests and bushy habitats; larvae develop in dead or living snails.

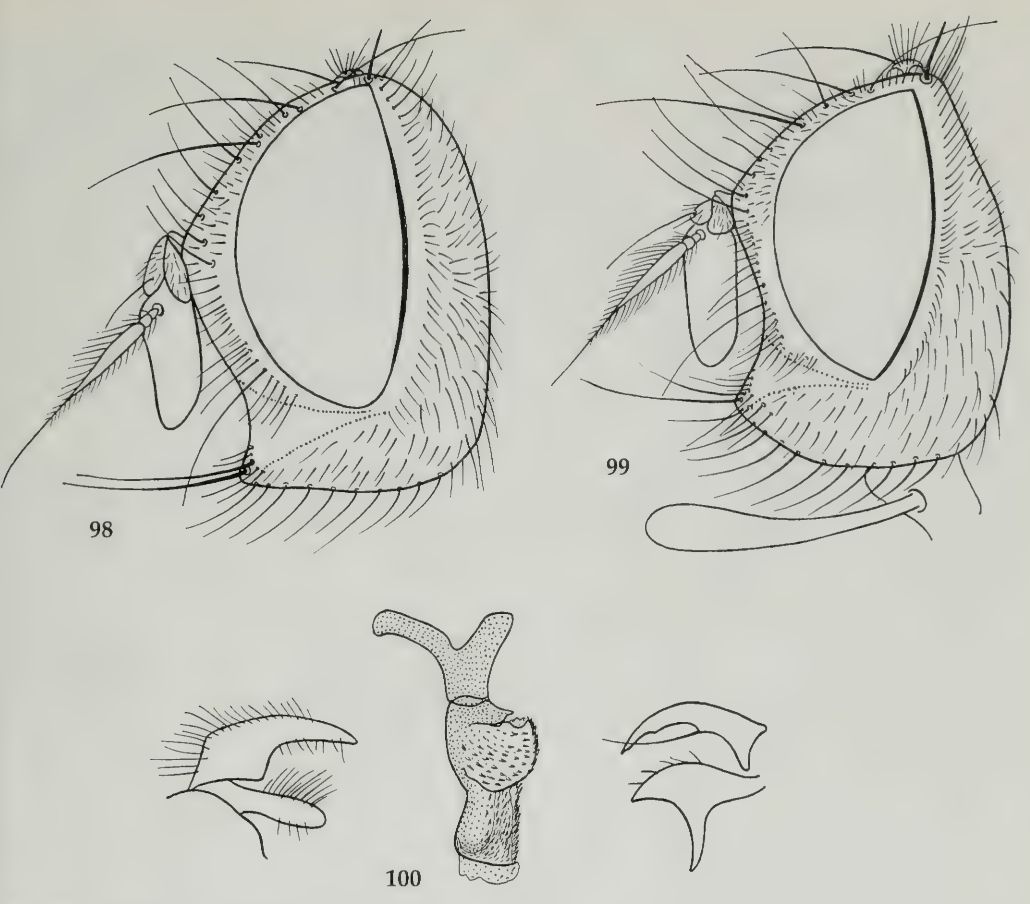



**Fig. 98.** *Eurychaeta muscaria.* Male head profile.
**Fig. 99.** *Eurychaeta muscaria.* Female head profile.
**Fig. 100.** *Eurychaeta muscaria.* Male genitalia, cercus and surstylus (left), gonites (right), aedeagus (center).

## Key to species of *Eurychaeta*

1. Frons in ♂ with 2 proclinate orbital bristles, pregonites pointed at apex. One parafacial bristle 2 times longer than others. Hind margin of tergite VIII in ♀ with medial cavity ............................................................ *E. muscaria* (Meig.)

– Frons in ♂ without proclinate or, pregonite rounded at apex. 3-4 parafacial bristles 2 times longer than others. Hind margin of tergite VIII in ♀ with one medial and two lateral cavities ............................................................ *E. palpalis* (R.-D.)

## *Eurychaeta muscaria* (Meigen, 1826)

Syst. Beschr. 5: 17 *(Sarcophaga).*

### Description

♂. Frons 0.53-0.36 and at antennal base 0.39-0.42 head width. Arista inflated in basal 0.4-0.5. vte indistinct. Only one parafacial bristle twice length of others (Fig. 98). Palpus terminally rather inflated. or 1+2. Vibrissal ridge with a few setae above vibrissal bristles. Scutellum with crossing ap, strong

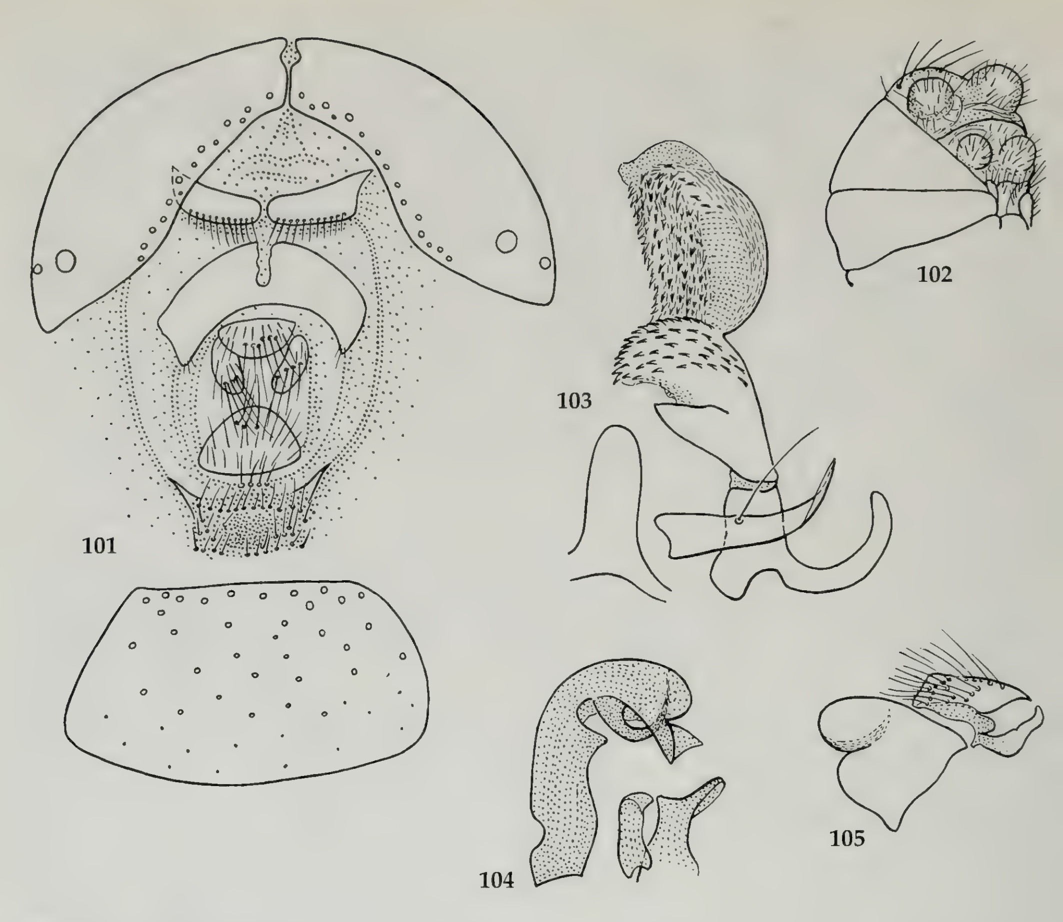



**Fig. 101.** *Eurychaeta muscaria*. Ovipositor, caudal view.
**Fig. 102.** *Agria mamillata*. Male abdomen, ventrolaterally.
**Fig. 103.** *Eurychaeta palpalis*. Male genitalia, laterally.
**Fig. 104.** *Agria mamillata*. Aedeagus and gonites, laterally.
**Fig. 105.** *Agria mamillata*. Cerci and surstyli, laterally.

subap, 1-2 pairs lateral and elongate basal bristles, and with 3-5 pairs of indistinct discal bristles. Genitalia (Fig. 100) with pregonites pointed, cercus apically curved.

♀. Abdominal tergite III with one pair of marginals; posterior margin of tergite VIII with medial cavity, sternite VIII reduced, membranous and with 4 setae (Fig. 99).

Body length 9-13 mm.

**Distribution:** Widely distributed in central and southern Europe to Ukraine in the east, and in North Africa.

### *Eurychaeta palpalis* (Robineau-Desvoidy, 1830)

Essai Myod. 337 *(Theria)*.

*Helicobosca distinguenda* Villeneuve, 1924. Ann. Sci. Nat. Zool. 10: 35.

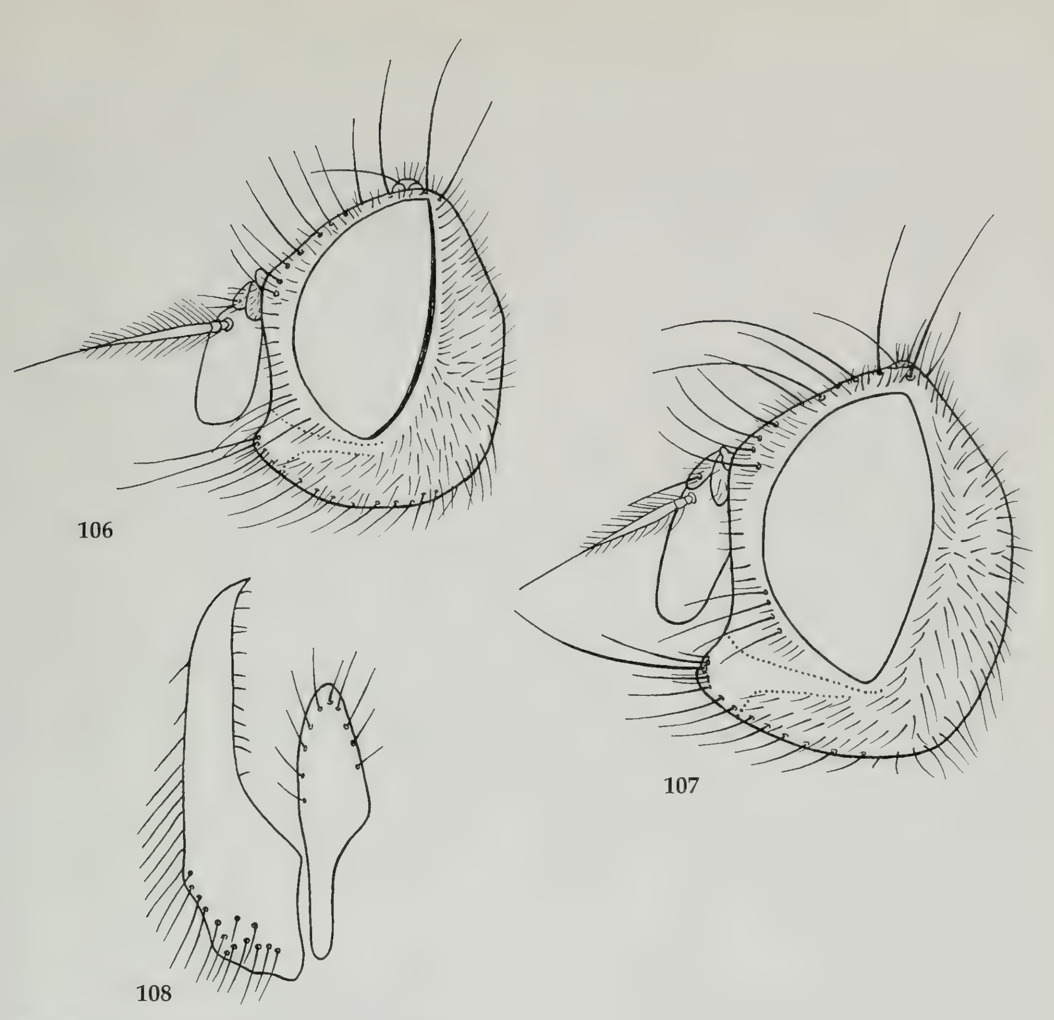



**Fig. 106.** *Eurychaeta palpalis*. Male head profile.
**Fig. 107.** *Eurychaeta palpalis*. Female head profile.
**Fig. 108.** *Eurychaeta palpalis*. Cercus and surstylus.

**Description**

♂. Frons 0.23-0.30 and at level of antennal base 0.32-0.36 head width. 3-4 parafacial bristles 2 times longer than others, palpus inflated apically, proclinate or absent (Fig. 106). Scutellum with ap crossed, subap strong, 1-3 pairs of laterals and elongate basals, and with 3 pairs of fine discals. Genitalia (Figs 103, 108) with pregonite apex rounded and cerci straight.

♀. or 1+2, frons 0.35-0.40 head width (Fig. 107). Abdominal tergite III with one pair of mediomarginals. Posterior margin of abdominal tergite VIII with 5 cavities, sternite VIII reduced.

Body length 7.5-13.0 mm.

**Distribution:** Widely distributed in Europe and south western Siberia.

### Tribe Paramacronychiini B. B.

Aedeagus consits of elongate paraphallus and ventrally disposed hypophallus (sometimes reduced). Body variation is considerable. The tribe comprises 7 subtribes, 18 genera and about 80 species.

## Subtribe Agriina Enderlein, 1928

Arch. klassif. phylog. Ent. 1 (1): 53.

♂. Frons narrower than eye height, proclinate or in ♂ absent. Gena 0.2-0.5 of eye height. Propleuron bare. $R_5$ open. Body with slight pruinescence. Epiphallus more or less, or entirely reduced. Parafacial with bristles or with strong hairs. 6 holarctic genera including more than 20 species. Adult flies prefer forest stands and bush, larvae are predators or parasitoids, occasionally necrophagous.

## Genus *Agria* Robineau-Desvoidy, 1830

Essai Myod. 376.
**Type species:** *Agria punctata* Robineau-Desvoidy, 1830.

*Pseudosarcophaga* Kramer, 1908. Ent. Wbl. 25: 200.
**Type species:** *Musca affinis* Fallén, 1817.

Medium-sized, grey flies (5-9 mm). ♂ frons narrow (0.06-0.13 head width), ♀ frons medium broad (about 0.3 head width), with 2 proclinate orbital bristles. 3rd antennomere 2 times longer than 2nd, arista haired. Parafacial narrow with vertical row of bristles, gena medium-height with black cilia (Fig. 109). Palpus elongate, apically somewhat inflated. 1-2 rows of postorbitals, ♂ vte indistinct, in ♀ well developed, ocellar bristles strong. Propleuron bare. ac 2-4+1, dc 2-4+3, spl 2+1, scutellum with 3 pairs of marginal and 1 pair of discal bristles. Costal spine absent or indistinct, $r_1$ bare, $r_{4+5}$ with several hairs basally, m-cu sigmoid. Abdominal tergites I+II and III without mediomarginal bristles. Surstyli in ♂ elongate, hypophallus well developed. Tergite VI in ♀ complete, tergites VII and VIII partly reduced, each consisting of a pair of haired lateral sclerites. Sternite VIII present, very small and membranous. 3 species occur in the palaearctic forest belt, and one species in the Nearctic region. Flies prefer humid forests and bush. Larvae are predators of lepidopterous prepupae, occasionally necrophagous.

**References:** Séguy 1941a, Encycl. ent. (A), Dipt. 21: 218-223; Venturi 1960, Frust. ent. 2, 7: 26-28; Verves 1982, Fliegen palaearkt. Reg. 11 (64 h.) Lf. 327: 271-277; Draber-Mońko 1989, Mem. Inst. Oswaldo Cruz 84, 4: 175-182; Pape 1992: Ent. scand. 23: 307-312.

### Key to species of *Agria* R.-D.

1. ♂ ........................................ 2.
– ♀ ........................................ 4.

2. Basicosta brownish red to black. Wing base and its margin grey to blackish. Cerci curved dorsally, epiphallus present ........................................ *A. monachae* (Kr.)
– Basicosta yellow, wings not darkened. Cercus straight, epiphallus absent ........................................ 3.

3. Abdominal segments VII+VIII and epandrium without paired knobs .................. *A. punctata* R.-D.
– Abdominal segments VII+VIII and epandrium with paired knobs .................. *A. mamillata* (Pand.)

4. Basicosta brownish red. Base and anterior wing margin fuscous to blackish. Abdominal tergite VIII bright red, big ........................................ *A. monachae* (Kr.)
– Basicosta yellow, wings hyaline (not fuscous). Tergite VIII small, brown to dark brown ............ 5.

5. Abdominal tergite X (epiproct) divided into 2 lateral lobes (sclerites) each with 2-3 setae. Spermatheca elongate ........................................ *A. mamillata* (Pand.)
– Abdominal tergite X complete, with numerous setae. Spermatheca short, ovoid ........................................ *A. punctata* R.-D.

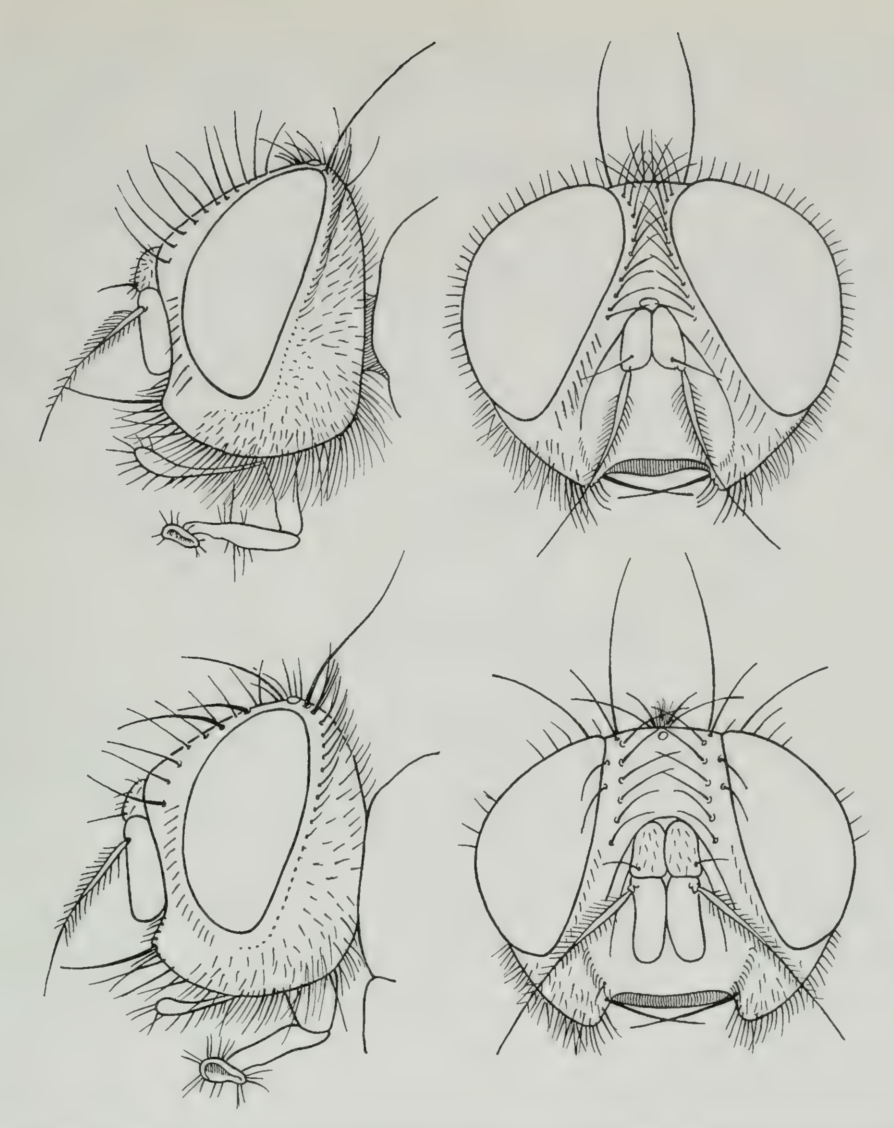


**Fig. 109.** *Agria* sp. Male head laterally and frontally (above), and female head laterally and frontally (bottom).

### *Agria mamillata* (Pandellé, 1896)

Revue Ent. 15: 172 *(Sarcophila)*.

**Description**

♂. Frons at narrowest part 0.12-0.15 and at antennal base 0.31-0.4 head width. Parafrontal, parafacial, lunula and fore part of gena silvery grey dusted, hind part of gena and metacephalon grey pruinose. Frontal vitta black, 2-4 times wider frontally. Antenna and palpus black, apical part of 2nd antennomere reddish. Arista inflated at basal 0.3-0.4. Parafacial at level of antennal base 0.14-0.21, gena 0.2-0.27 eye height. 8-12 fr, ocellar bristles rather weak; h 2-4, ph 1-2, ia 0+1, 2-3, spl 1+1; $t_2$ with 2-3 ad. Ratio between 3rd and 5th costal sections 1 : 0.9-1.2. Thorax grey pollinose. Presutural part of mesonotum with 5 narrow black stripes three of which expand on postsutural part. Legs black, wings hyaline, basicosta yellow.

Abdomen grey dusted, tergites I+II almost black, tergites III-V each with medial longitudinal black stripe and with pair of lateral black spots, otherwise with chequered pattern. Genitalia protruding, black, grey pollinose. 2 pairs of knobs situated on segments VII+VIII and epandrium (Figs 102, 104, 105).

♀. Frons 0.3-0.33 of head width, frontal vitta parallel-sided, 1.5-2.1 times broader than parafrontal, vte present. Tergite X divided into 2 oval sclerites, each with 2-3 setae. Spermatheca elongate (Figs 110, 112).

Body length 6-9.5 mm.

**Distribution:** Transpalaearctic (Europe, Transcaucasia, central Asia, southern Siberia, Far East). Larvae are predators of prepupae of Lepidoptera, notably *Yponomeuta* species: *Yponomeuta cognatellus* Hbn. (Baer 1921; Karasejeva 1951 etc.), *Y. evonymellus* L. (Tiensuu 1939, Artamonov 1985 etc.), *Y. malinellus* Z. (Bilanovsky 1938, Petrov 1981, Yunnikkala 1960 etc.), *Y. orientalis* Zag. (Artamonov, 1985), *Y. padellus* L. (Baer 1921, Junnikkala 1960 etc.), *Y. rorellus* Hbn. (Grigoryan 1987) and also the lymantriid *Euproctis chrysorrhoea* L. (Stratan 1984).

## *Agria monachae* (Kramer, 1908)

Ent. Wbl. 25: 201 *(Pseudosarcophaga).*

### Description

♂. Frons at narrowest part 0.06-0.1 and at antennal base 0.21-0.25 head width. Parafrontal and parafacial silvery white or yellowish grey dusted, lunula, gena and metacephalon black, slinghtly grey pruinose. Frontal vitta black, at frons middle 4-7 times as broad as parafrontal, 2-3 times wider frontally. Antenna and palpus black. Arista inflated at basal 0.3-0.4. Parafacial at antennal base 0.14-0.19 and gena 0.17-0.2 eye height. Frontal bristles 12-16, postorbital bristles single row. h 3-4, ph 2-4, spl 2+1. $t_2$ with 2-4 ad. Ratio between 3rd and 5th costal sections 1 : 0.6-0.9. Thorax dark grey pollinose. Mesonotum with 3 longitudinal stripes, presuturally two additional stripes present. Legs black. Basicosta and epaulet ferrugineous to black. Base and anterior margin of wing fuscous or greyish to blackish.

Abdomen dark grey dusted, with chequered pattern; tergites III-V each with medial stripe and paired rounded lateral spots, mostly indistinct. Genitalia lustrous black. Cercus rounded dorsally (Fig. 113), epiphallus elongate, paraphallus directed ventrally, hypophalus dorsally (Fig. 114).

♀. Frons 0.3-0.33 head width, frontal vitta black with parallel edges, 2-3 times wider than one parafrontal, vte present, fr 7-9 pairs; abdominal tergite X complete, tergite VIII large with numerous setae, bright red, clearly visible on background of the other black sclerites.

Body length 5-9.5 mm.

**Distribution:** Widely distributed in forests of Siberia and Far East, rare in Europe reaching Germany and only penetrating individually to west.

Larvae are necrophagous but are known as predators of prepupae of Lepidoptera: *Dendrolimus pini* L. (Ryvkin 1958, Yarmanshewich 1970), *D. superans sibiricus* Tshetv. (Yarmanshewich 1970, Artamonov 1985), *Lymantria dispar* L. (Artamonov 1985), *L. monacha* L. (Kramer 1908, Kolomyietz 1958, Artamonov 1985).

## *Agria punctata* Robineau-Desvoidy, 1830

Essai Myod. 377.

*Musca affinis* Fallén, 1817. Kgl. Vetensk. Akad. Handl. 3: 237 (nom. preocc. by Turton 1800 and Lamarck 1816).

### Description

♂. Frons at narrowest part 0.1-0.15 and at antennal base 0.32-0.39 head width. Head coloration as in *A. mamillata.* Frontal vitta in middle of frons 3-5 times wider than parafrontal and widening 2-3 times frontally. Parafacial at antennal base 0.12-0.18 and gena 0.19-0.24 eye height. Thorax and

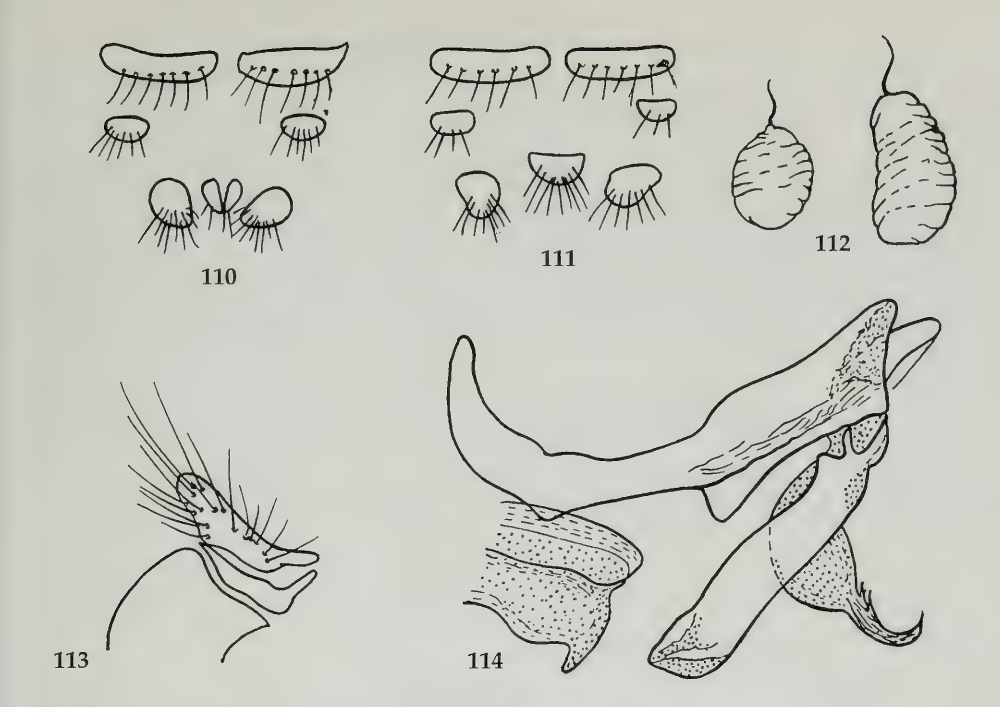



**Fig. 110.** *Agria mamillata.* Tergites VII-IX and cercus (ovipositor), dorsally.
**Fig. 111.** *Agria punctata.* Tergites VII-IX and cerci (ovipositor), dorsally.
**Fig. 112.** *Agria.* Spermathecae, *A. punctata* (left), *A. mammilata* (right).
**Fig. 113.** *Agria monachae.* Male cercus and surstylus, laterally.
**Fig. 114.** *Agria monachae.* Aedeagus and gonites, laterally.

abdomen very similar to *A. mammilata*. Genitalia also similar as in *A. mamillata*, but paired knobs on postabdomen absent.

♀. Genitalia differ from those of *A. mamillata* by the complete Xth tergite with numerous setae (Fig. 111) and by short ovoid spermatheca (Fig. 112).

Body length 5-9 mm.

**Distribution:** Widely distributed in Europe, Transcaucasia, Siberia and central (montane) Asia and Mongolia. Larvae are predators on lepidopterous prepupa: *Amphidasis betularia* L. (Stěpanova, Girfanova et al. 1977), *Anticlea derivata* Den. & Schiff. (Lundbeck 1927), *Aphelia* sp. (Pape 1987b), *Aporia crataegi* L. (Vasiliev 1902), *Arctija caja* L. (Verves 1982b), *Autographa gamma* L. (Pape 1987b), *Biston hirtaria* Ch., *B. boreata* Hb., *B. pomonaria* Hb. (Stepanova et al. 1977), *Cacoecia murinana* Hb. (Draber-Mońko 1973), *Dendrolimus pini* L. (Vasiliev 1913, Baer 1921, Čepelák 1952, Shapiro 1956; Ryvkin 1958, Khitzova 1968, Herting & Simmonds 1976, etc.), *D. segregatus* Butl. (Vasiliev 1913), *D. sibiricus* Tschetv. (Rohdendorf & Verves 1979b), *Diastictis artesiaria* F., *Erannis defoliaria* Cl. (Stepanova et al. 1977), *Euproctis chrysorrhoea* L. (Girfanova 1957), *Hyphantria cunea* Fr. (Verves 1982), *Larentia nigrofasciata* F. (Séguy 1941a), *Leucoma salicis* L. (Nielsen 1914, Baer 1921, Dyadechko 1959, Entin 1971 et al.), *Lymantria dispar* L. (Baer 1921, Girfanova 1957, Kolomyietz 1958, Kolybin et al. 1971), *L. monacha* L. (Baer 1921, Kolomyietz 1958, Nakonechnyi 1973b), *Malacosoma neustria* L. (Tudor & Marcu 1971), *Operophtera brumata* L., *O. chenopodiata* L., *Phigalia pedaria* F. (Stepanova et al. 1977), *Vanessa io* L. (Verves 1982b). They also attack sawfly pupae: *Diprion pini* L., *Empria abdominalis* F. (Baer 1921).

## Genus *Angiometopa* Brauer & Bergenstamm, 1889

Denkschr. Akad. Wiss. Wien 56: 125.
**Type species:** *Musca ruralis* Fallén, 1817.

Medium sized to big (7-11 mm) grey flies. ♂ frons narrow, ♀ frons mederately broad, 2 pairs of proclinate or. 3rd antennomere 1.5-2 times as long as 2nd, arista haired. Parafacial bristled, gena comparatively high (0.3-0.4 eye height). dc 2-3+3, spl 2+1, propleuron bare. Scutellum with 3 pairs of marginals and 1-2 pairs of short discals. $R_5$ open, $r_1$ bare, $r_{4+5}$ with several setae at base, costal spine well developed. Mesonotum with 3 longitudinal black spots, legs black, wings hyaline. Abdominal tergites each with 3 distinct black spots. ♂ genitalia with narrow hooklet-formed cerci, surstyli narrow and elongate, epiphallus very small, ventral arms of distiphallus very big, epiphallus well developed. ♀ with VIth abdominal tergite complete, tergites VII and VIII small, membranous, each consisting of paired sclerites.

The genus comprises 5 palaearctic and one neotropical species. Flies frequent mesophytic vegetation in forest clearings. Larvae live in wounds of mammals or are predators of lepidopterous larvae.

**References:** Kurahashi 1975: Kontyu 43 (2): 207-209; Verves 1982: Fliegen palaearkt. Reg. 11 (64 h), Lf. 327: 277-284; Pape 1982: Ent. scand. 23: 312-315.

### *Angiometopa falleni* Pape, 1986

Ent. scand. 17: 306 (new name for *Musca ruralis* Fall.).

*Musca ruralis* Fallén, 1817. K. Vetensk. Akad. Handl. (3) (1816): 236 (nom. preocc. by Gravenhorst 1807).

#### Description

♂. Frons at narrowest part 0.19-0.24 and at antennal base 0.35-0.45 head width (Fig. 122). Parafrontal and parafacial light grey dusted, occasionally yellowish; lunula, gena and metacephalon grey pollinose. Frontal vitta black with sparse grey pollinosity, frons middle 2-4 times broader than parafrontal, 1.3-2.0 wider frontally. 1st and 2nd antennomere reddish or brownish, 3rd antennomere black, occasionally reddish basally, arista inflated in basal 0.25-0.35. Palpus yellow to reddish. Frontal bristles 9-12 pairs. One row of postorbital setae, vte absent, oc not very strong, parafrontal sparsely haired, parafacial with some bristles in two poorly defined vertical rows. ac 2+1, dc 3-4+5, h 3-4, ph 2-3, ia 0-1+2-3. Mid femora with ctenidium consisting of one row of short and thick spine-like bristles. Ratio between 3rd and 5th costal sections 1 : 0.9-1.1, m-cu sigmoid. Basicosta yellow, squama white or yellowish. Abdominal tergites I+II without mediomarginals, such bristles present but usually indistinct on tergite III. Genitalia grey pollinose; abdomen densely grey dusted and with three black spots on each tergite. Central spot on tergite V poorly developed or absent. Genitalia medium-sized (Figs 116, 117, 118).

♀. Frons 0.33-0.40 and at antennal base 0.4-0.44 head width. or 1+2. Frontal vitta parallel-sided, about 1.5-2 times broader than parafrontal. Tergite VII complete and haired, tergite VIII consisting of 2 small lateral sclerites, each with 2-3 setae. Genitalia reddish.

Body length 6-11 mm.

**Distribution:** Widely distributed in Europe, Transcaucasia, southern Siberia, mountains of central Asia and Mongolia. Larvae develop in pupae of *Lymantria monacha* (Komárek 1938) and in wounds of horse and man (Séguy 1941a, van Emden 1954).

## Genus *Brachicoma* Rondani, 1856

Dipt. Ital. Prodr. 1: 69.
**Type species:** *Tachina nitidula* Rondani, 1856 (misidentification, not Meigen 1824) (syn. of *Tachina devia* Fallén, 1820).

Medium-sized to big greyish or blackish flies. ♂ frons narrower than eye width and without proclinate orbital bristles; ♀ frons broader than eye and with 2 pairs of proclinate or. 3rd antennomere twice length of 2nd, arista bare or micropubescent, inflated in basal 0.3-0.5. Frons and oral margin protrud-

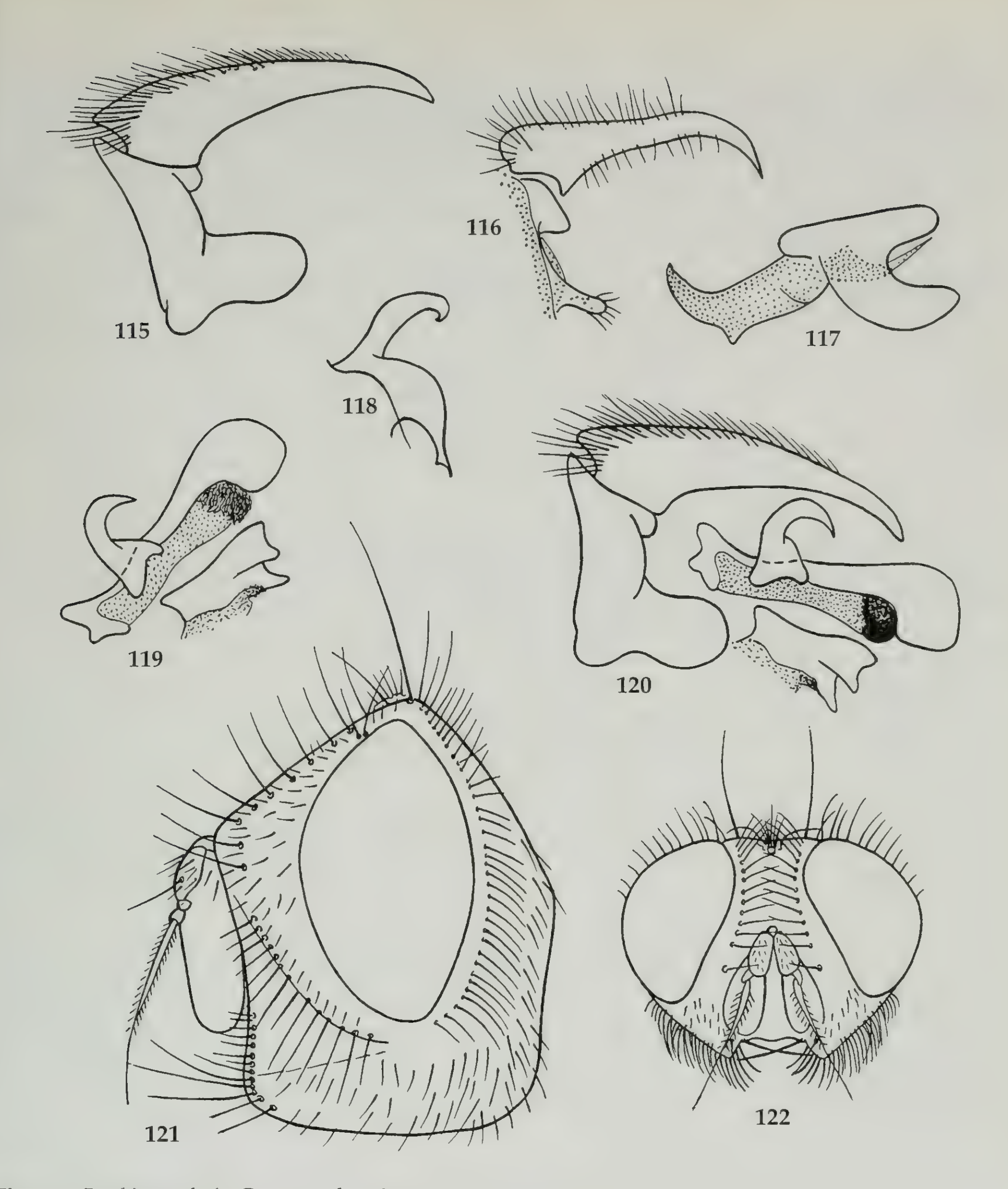



**Fig. 115.** *Brachicoma devia*. Cercus and coxite.
**Fig. 116.** *Angiometopa falleni*. Cercus and surstylus, laterally.
**Fig. 117.** *Angiometopa falleni*. Aedeagus, laterally.
**Fig. 118.** *Angiometopa falleni*, gonites.
**Fig. 119.** *Brachicoma devia*. Aedeagus and gonites, laterally.
**Fig. 120.** *Brachicoma devia*. Male genitalia complex, laterally.
**Fig. 121.** *Brachicoma devia*. Male head laterally.
**Fig. 122.** *Angiometopa falleni*. Male head frontally.

ing. Parafrontal and parafacial haired or with bristles. Gena high, 0.3-0.5 higher than eye, haired. Palpus brown to black. dc 2-4+3, spl 1-3+1, propleuron bare. Scutellum with 3 pairs of marginals and 1-2 pairs of discals. Mid femur in ♂ with a ctenidium, apically consisting of a row of short pv. $t_2$ with 2-4 ad. Costal spine elongate, $R_5$ open, occasionally closed, $r_1$ bare, $r_{4+5}$ with some basal setae. Thorax

greyish or bluish grey, sparsely pollinose, mesonotum with 3 longitudinal black stripes. Legs black, wings hyaline. Abdominal tergites silvery or grey pollinose with chequered pattern, tergite margins lustrous black posteriorly. Cercus in ♂ hooklet-formed, surstyli elongate but broad, epiphallus and hypophallus reduced, paraphallus elongate, well sclerotized. ♀ with tergite VI complete or bilobate (*Brachicoma asiatica* Rohd. & Verv.), tergites VII and VIII small, membraneous, each consisting of a pair of lateral sclerites.

The genus comprises 8 holarctic taxa. Flies frequent forest habitats, larvae are predators of larvae and pupae of bumblebees and social wasps.

**References:** Rohdendorf & Verves 1979: Ent. Obozr. 58: 197-198; Verves 1982: Fliegen palaearkt. Reg. 11 (64 h), Lf. 327: 286-293.

### *Brachicoma devia* (Fallén, 1820)

Monogr. Musc. Svec. 6 (*Tachina*).

**Description**

♂. Frons at narrowest part 0.24-0.27 and at antennal base 0.35-0.42 head width. Parafrontal, parafacial and lunula silvery grey pollinose, gena and metacephalon grey dusted, frontal vitta black with grey lustre in anterior view, at frons middle 2 times broader than parafrontal, parallel-sided. Parafacial at antennal base 0.3-0.36 and gena 0.38-0.43 eye height. Antenna black, palpus dark brown to black. One row of postorbitals, vte absent or very small (Fig. 121), fr 8-13, parafrontal more or less densely haired, parafacial with a row of bristles along interior margin and with hairs in upper part, facial ridge with setae ventrally. Gena and metacephalon with numerous black hairs. ac 0+1, ia 0+2-3, ph 1-2, npl 2, spl 2+1, or 1+1+1. Legs black. Basicosta yellow, epaulet yellowish brown to brown. 3rd and 5th costal sections equal length. Abdomen black, silvery dusted on anterior 0.5-0.7 of tergites I+II-V, hind margins of these tergites lustrous black. Tergite III with 2-4 mediomarginal bristles. Genitalia lustrous black, protruding (Figs 119, 120).

♀. Frons 0.31-0.38 of head width with 2 strong proclinate or bristles. Frontal vitta 1.1-1.3 times broader than parafacial, 2nd antennomere with reddish apex. Ctenidium on mid femora absent. VIth abdominal tergite complete.

Body length 6-12 mm.

**Distribution:** Widely distributed throughout the Palaearctic region. Flies frequent mesophytic and hydrophytic forest formations, clearings and meadows, and often feed at flowers of Asteraceae, Apiaceae, Euphorbiaceae etc. and also on flesh. Larvae are predators of preimaginal instars of bumblebees *Bombus agrorum* F., *B. hypnorum* L., *B. hortorum* L., *B. lapidarius* F., *B. pratorum* L., *B. ruderatus* F., *B. silvarum* L., *B. soroensis* F., *B. terrestris* L.; and in Vespidae: *Vespula silvestris* Scop. (Baer 1921, Lundbeck 1927, Séguy 1941a, Hasselrot 1960, Pouvreau 1973, Verves 1982b, Pape 1987b, Alford 1975 etc.).

### Subtribe Nyctiina Enderlein, 1928

Small to medium-sized blackish flies nearly without pollinosity. ♂ with frons narrow and without proclinate or. ♀ frons broader, with two pairs of proclinate orbital bristles. Parafacial narrow, with a row of bristles, gena of medium height. dc 2-3+3. Propleuron bare. $t_2$ with 2-4 ad. Basiphallus and distiphallus fused but mobile, ventral arms petiolate, spinose; paraphallus membranous, elongate. ♀ with abdominal tergite VI narrow, tergites VI and VII each with pair of stigmata situated in membrane near tergite. One palaearctic genus.

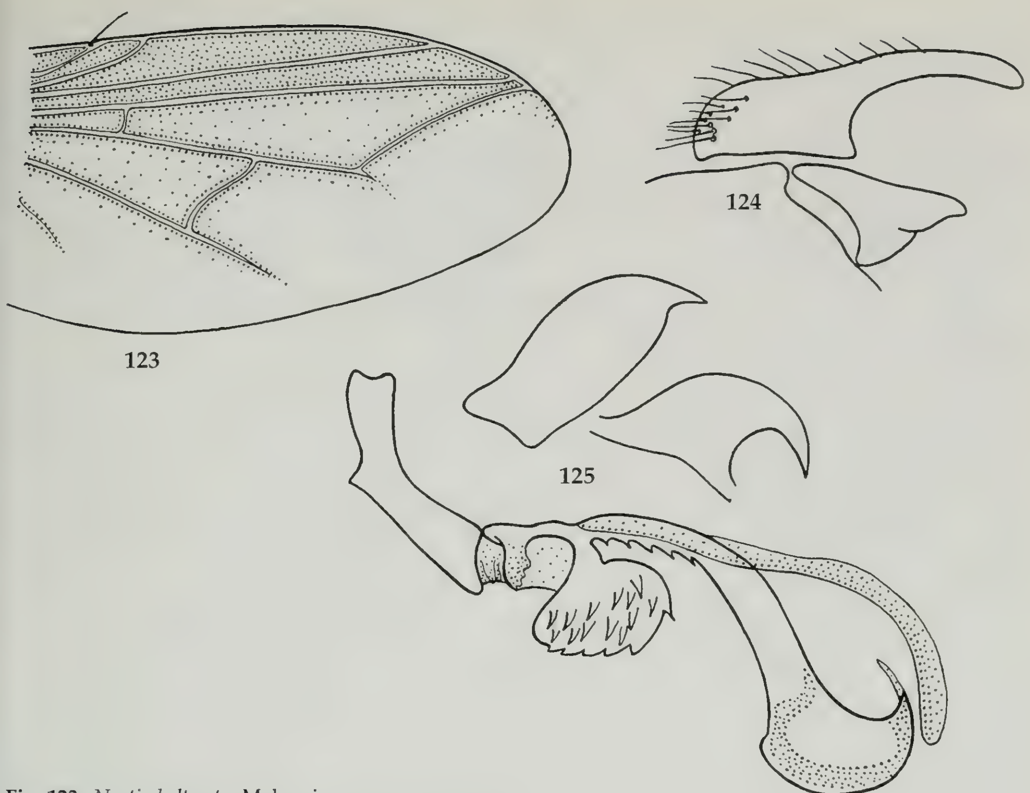



**Fig. 123.** *Nyctia halterata*. Male wing.
**Fig. 124.** *Nyctia halterata*. Cercus and surstylus, latarally.
**Fig. 125.** *Nyctia halterata*. Aedeagus and gonites, laterally.

## Genus *Nyctia* Robineau-Desvoidy, 1830

Essai Myod. 262.
**Type species:** *Nyctia carceli* Robineau-Desvoidy, 1830 (recte *Musca halterata* Panzer, 1798).

3rd antennomere 1-1.3 times longer than 2nd, arista with long setae. ♂ middle femora with ctenidium; wings fuscous, $R_5$ open, closed or petiolate. Body bristles very strong. Abdominal tergite III with pair of strong mediomarginal bristles. One species.

**References:** Séguy 1941: Encycl. ent. (A) Dipt. 21: 358-359; Verves 1982: Fliegen palaearkt. Reg. 11 (64 h.) Lf. 327: 233-265; Pape 1987: Fauna ent. scand. 19: 95-96.

### *Nyctia halterata* (Panzer, 1798)

Fauna ins. germ. 54: 13 *(Musca)*.

*Musca maura* Fabricius, 1805: Syst. antl. 302:
*Dexia caminaria* Meigen, 1826. Syst. Beschr. 5: 40.
*Nyctia carceli* Robineau-Desvoidy, 1830. Essai Myod. 263.

#### Description

♂. Frons at narrowest part 0.08-0.15 and at antennal base 0.28-0.35 head width. Head black, lower part of parafrontal and parafacial sparsely grey or silvery pollinose. Frontal vitta 2-3 times broader

frontally. Antenna and palpus black. Parafacial at antennal base 0.9-0.14 and gena 0.18-0.25 eye height. One row of postorbital bristles, vte well developed, ocellar bristles fine, fr 6-12, strong. Gena and metacephalon densely setose.

Thorax and legs black. ac 0-2+1, ia 0+2-3, h 3-5, ph 1-2, npl 2, spl 1+1. Scutellum with strong ap and bas, lateral and subapical bristles absent or very delicate, 2-3 pairs of discal setae. Wing distinctly infuscate costally and along veins (Fig. 123). Costal spine very long and strong. Ratio between 3rd and 5th costal sections 1 : 1.3-2. $r_1$ bare, first section of $r_{4+5}$ entirely haired. m-cu straight or curved. Basicosta and epaulet black (in European specimens).

Abdominal tergites IV and V with row of marginal bristles; genitalia medium-sized (Figs 124, 125). Abdomen lustrous black.

♀. Frons 0.27-0.33 head width, vitta frontalis parallel-sided and as broad as parafrontal which is covered with short black setae. Wings hyaline or fuscous. Abdominal tergites VII and VIII consist of small membraneous lateral sclerites.

Body length 4-9 mm.

The species shows some variation in wing colouration and form. Especially some mediterranean populations show more pollinosity, yellow basicosta (typically black) and have petiolate cell $R_5$ (see also Pape 1987b).

**Distribution:** Widely distributed in Europe including the British Isles, and ranging to Canary Islands, North Africa, Israel, Arabia, Iran and Transcaucasia. Flies frequent humid forests and bushes and hygrophytic meadows, feeding at flowers. Larvae develop in snails of *Helicella (Xeropicta) krynikii* (pers. comm. Mr. Nasrollahi, Iran).

### Subtribe Paramacronychiina Brauer & Bergenstamm, 1889

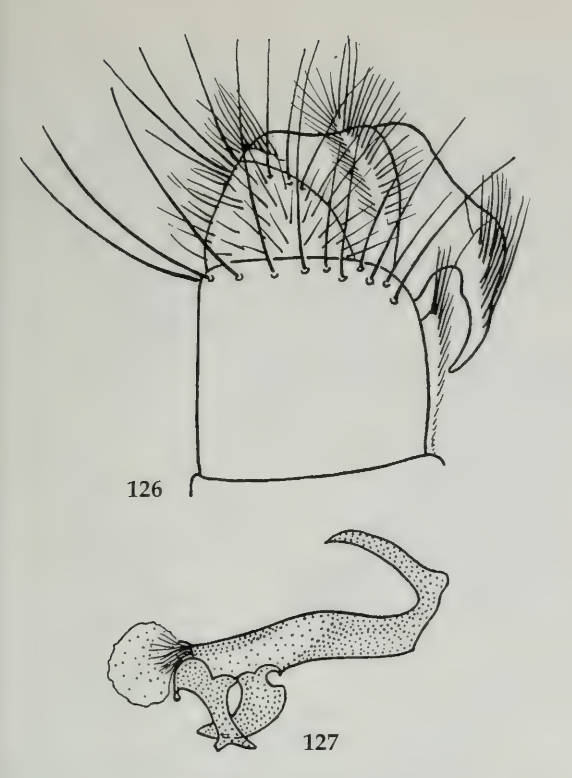
Eyes small; parafacial and gena very broad – gena at least 0.5 eye height. Pollinosity well developed. ♂ frons narrow, without proclinate orbitals, ♀ frons broader, with 2-3 pairs of proclinate or. 3rd antennomere 0.8-1.5 times length of 2nd arista bare or micropubescent. Vibrissal angles raised over oral margin; lunula narrowed ventrally. Propleuron bare. $R_5$ open, occasionally closed or petiolate. Epiphallus present, hypophallus very big, apical plate present, membranous. Abdomen with chequered pattern. 2 palaearctic genera.

### Genus *Paramacronychia* Brauer & Bergenstamm, 1889

Denkschr. Akad. Wiss. Wien 56: 116.
**Type species:** *Macronychia flavipalpis* Girschner, 1881.

Big or medium-sized (7-12 mm) flies. Body blackish, densely grey dusted. Frons and lower facial margin moderately protruding. Parafacial with dense hairs, vibrissal bristles very strong. Palpus brown to yellow. ac 0+1, dc 3-5+3, spl 2-3+1, propleuron bare. Scutellum with 3-4 pairs of marginals and one pair of discals. $t_2$ with 2-4 ad, middle femur in ♂ with a ctenidium consisting of numerous spine formed pv. Wings hyaline, $r_1$ bare, $r_{4+5}$ with several hairs in basal 0.2-0.4 of its first section. Ratio between 3rd and 5th costal sections 1 : 0.9-1.2. Basicosta yellow, epaulet yellowish brown to brown. Abdominal tergites with marginal bristles, except tergites I+II often missing marginals. Ventral arms of paraphallus elongate, well sclerotized. ♀ with entire tergite VI and with tergites VII and VIII bilobate. One palaearctic species.

**References:** Séguy 1941: Encycl. ent. (A) Dipt. 21: 327-328; Venturi 1960: Frust. ent. 2 (7): 111; Verves 1982: Fliegen palaearkt. Reg. 11 (64 h.) Lf. 527: 266-269; Pape 1987: Fauna ent. scand. 19: 96-98.



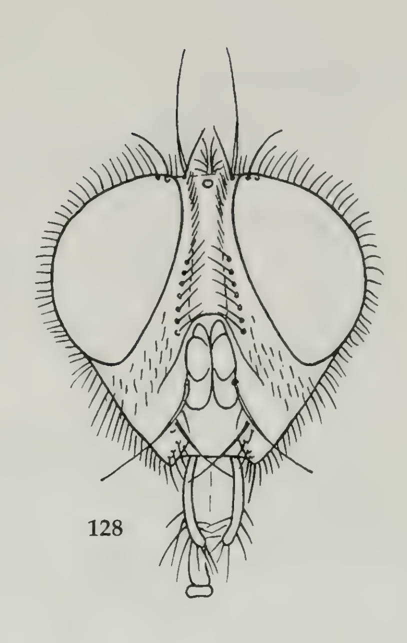




**Fig. 126.** *Paramacronychia flavipalpis.* Male terminalia, laterally.
**Fig. 127.** *Paramacronychia flavipalpis.* Aedeagus, lateral view.
**Fig. 128.** *Paramacronychia flavipalpis.* Male head, frontally.

### *Paramacronychia flavipalpis* (Girschner, 1881)

Ent. Nachr. 7: 279 *(Macronychia).*

*Paramacronychia hackmani* Verves, 1979. Ann. ent. fenn. 45: 31.

**Description**

♂. Frons at narrowest part 0.12-0.20 and at antennal base 0.38-0.54 head width (Fig. 128). Parafacial, parafrontal, lunula and gena yellowish grey to silvery grey dusted, mediana reddish brown, without pollinosity. Frontal vitta black, frons middle 1.2-3 times wider than parafrontal, and narrowing 2-3 times frontally. 3rd antennomere 1-1.5 times longer than 2nd, arista inflated in basal 0.2-0.3. Antenna black, 2nd antennomere reddish apically. Parafacial at antennal base 0.32-0.36, gena 0.47-0.62 of eye height. One row of regular postorbital bristles, vte indistinct, ocellar bristles comparatively strong, fr 8-20, medium length. Parafacials with numerous black setae, gena and metacephalon covered with dense black hairs.

Thorax black, grey dusted, mesonotum yellowish grey pollinose, with 3 longitudinal black stripes, legs black, wings hyaline, slightly infuscated along veins and costal margin. ia 0+1-3, h 3-6, ph 1-2, npl 2. $R_5$ open, occasionally closed at wing margin.

Abdomen black, with grey to yellowish grey chequered pattern, hind margin of tergites lustrous black and with medial longitudinal black stripe, genitalia protruding, black (Figs 126, 127).

♀. Frons 0.36-0.45 of head width, with 2 pairs of strong proclinate or, frontal vitta parallel-sided, 1.2-2 times broader than one parafrontal. Abdominal tergites I+II without marginal setae.

Body length 7-12 mm.

**Distribution:** Widely distributed in mountains of Europe and northern Asia. Ecology unknown.

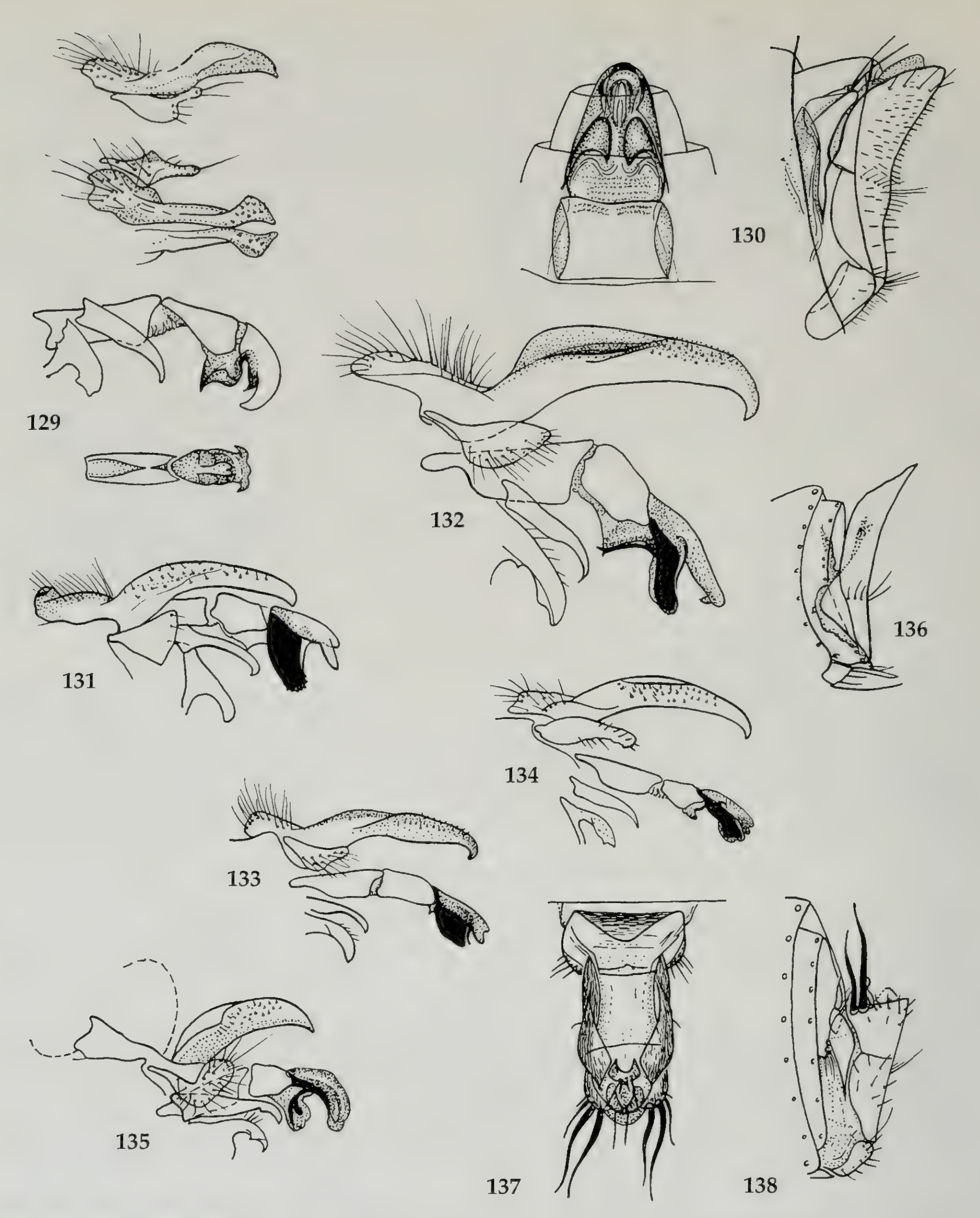



**Fig. 129.** *Blaesoxipha cochlearis.* Male genitalia: cercus and coxite laterally and dorsally (above), and aedeagus (with gonites) laterally and dorsally (bottom).
**Fig. 130.** *Blaesoxipha cochiearis.* Ovipositor: Dorsal view (left) and lateral view (right).
**Fig. 131.** *Blaesoxipha grylloctona.* Male genitalia profile.
**Fig. 132.** *Blaesoxipha occatrix.* Male genitalia profile.
**Fig. 133.** *Blaesoxipha plumicornis.* Male genitalia profile.
**Fig. 134.** *Blaesoxipha pygmaea.* Male genitalia, profile.
**Fig. 135.** *Blaesoxpha redempta.* Male genitalia profile.
**Fig. 136.** *Blaesoxipha grylloctona.* Ovipositor, laterally.
**Fig. 137.** *Blaesoxipha redempta.* Ovipositor, dorsally.
**Fig. 138.** *Blaesoxipha redempta.* Ovipositor, laterally.

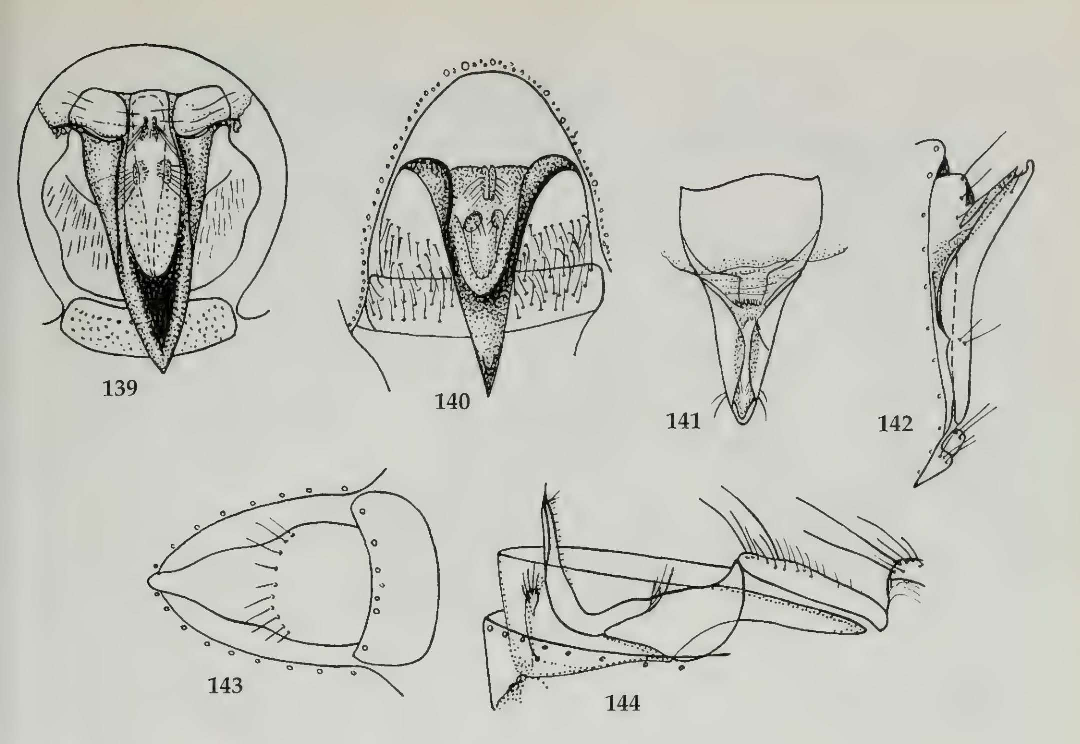



**Fig. 139.** *Servaisia erythrura*. Ovipositor, ventrally.
**Fig. 140.** *Servaisia rossica*. Ovipositor, ventrally.
**Fig. 141.** *Blaesoxipha pygmaea*. Ovipositor, dorsally.
**Fig. 142.** *Blaesoxipha pygmaea*. Ovipositor, laterally.
**Fig. 143.** *Blaesoxipha plumicornis*. Ovipositor, ventrally.
**Fig. 144.** *Blaexoxipha occatrix*. Ovipositor, laterally.

### Subtribe Wohlfahrtiina Rohdendorf, 1928

Uzbek. Expl. Sta. Plant Prot. 14: 12.

Flies of different size, brightly coloured, partly whitish cinereous with dark or blackish abdominal spots and stripes. Frons in both sexes broader than eye, with proclinate or. Parafacials bare or with small setae, without strong bristles. Arista bare, rarely micropubescent or haired. Vibrissae well developed, facial ridge only at 0.2-0.3 basally setose. Frons and oral margin protruding. $t_2$ with 2-4 ad. Surstylus apically inflated, epiphallus weak. 5 genera containing 35 species occur in the Palaearctic region; some species of *Wohlfahrtia* also occur in the Nearctic and the Afrotropical and Oriental regions. Larvae are essentially necrophagous, but several species show a trend to primary myiasis of animals and man.

### Genus *Sarcophila* Rondani, 1856

Dipt. Ital. Prodr. 1: 86.
**Type species:** *Musca latifrons* Fallén, 1817.

*Agria* Macquart, 1835 (misidentification, not Robineau-Desvoidy 1830).

Grey or olive grey small flies (3.5-8 mm). Frontal vitta broader than one parafrontal. Parafacial and gena medium width, haired. 3rd antennomere 1.5-2.5 times longer than 2nd, arista ciliate. Palpus black. Thoracic stripes poorly developed, legs black, wings hyaline, sometimes slight fuscous basally

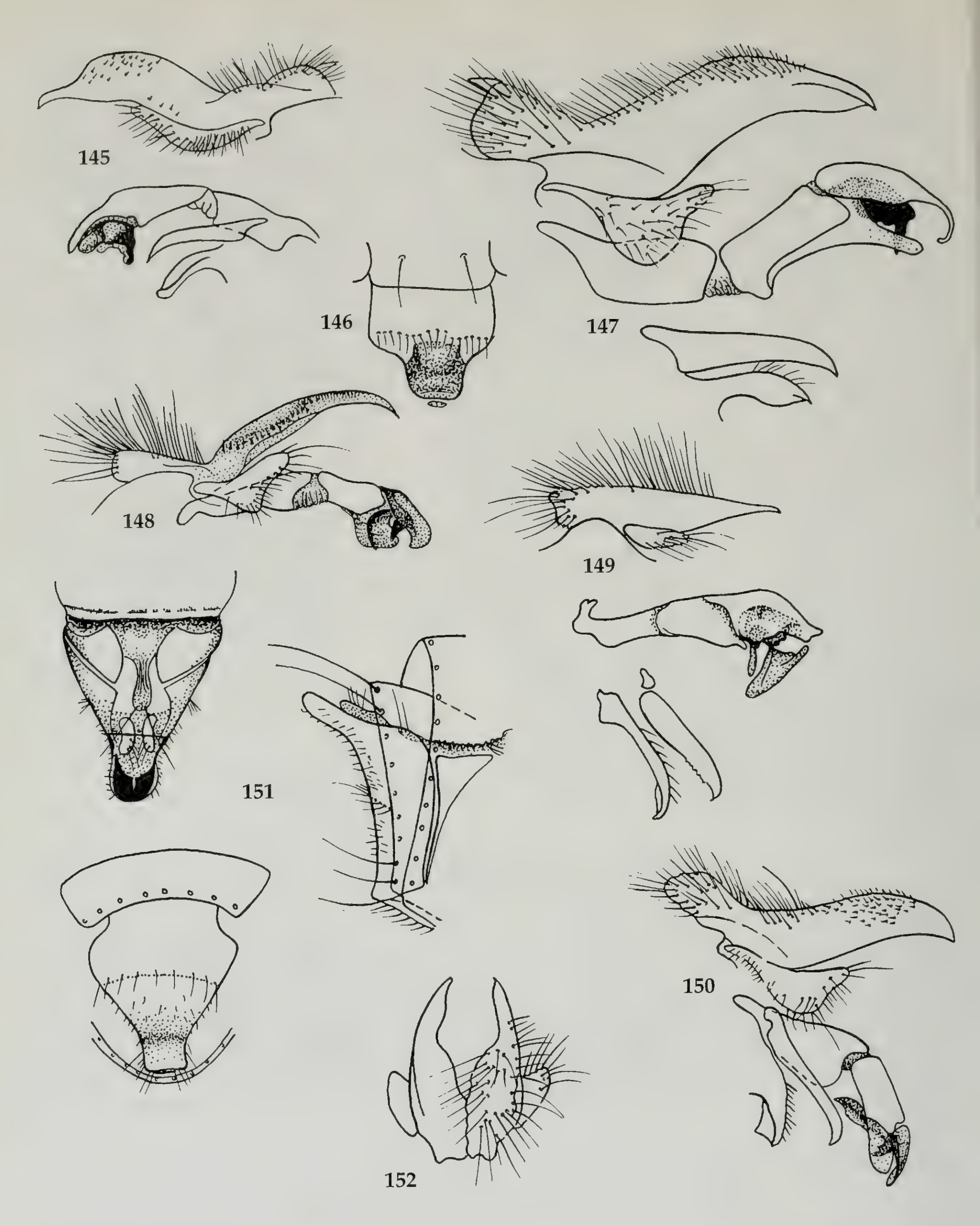



**Fig. 145.** *Tephromyia grisea.* Male genitalia, laterally.
**Fig. 146.** *Tephromyia grisea.* Ovipositor, ventrally.
**Fig. 147.** *Servaisia rossica.* Male genitalia, laterally.
**Fig. 148.** *Blaesoxipha ungulata.* Male genitalia, laterally.
**Fig. 149.** *Ravinia pernix.* Male genitalia, laterally.
**Fig. 150.** *Servaisia erythrura.* Male genitalia, laterally.
**Fig. 151.** *Blaesoxipha ungulata.* Ovipositor laterally (right), dorsally (above) and ventrally (bottom).
**Fig. 152.** *Ravinia pernix.* Cerci and coxite, dorsally.

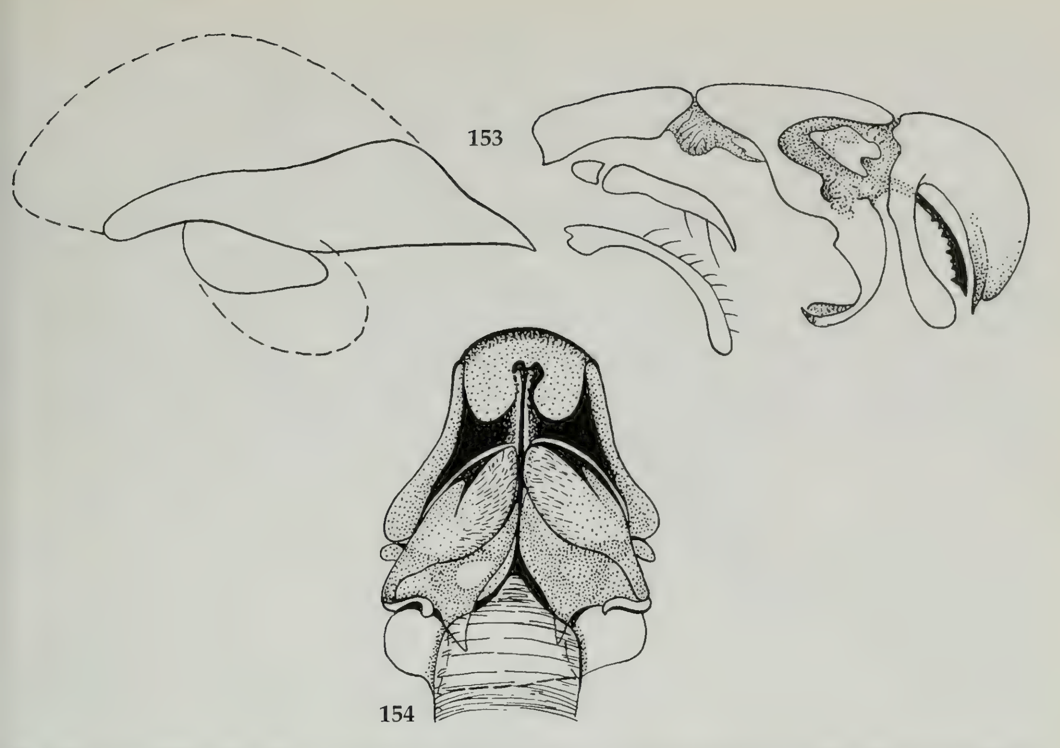



**Fig. 153.** *Discachaeta amita*. Male genitalia, laterally; cercus and coxite (left), basiphallus and distiphallus (right).
**Fig. 154.** *Discachaeta cucullans*. Distiphallus ventrally.

near costa; ac 1-2+1, dc 2-3+3, spl 1+1, scutellum with 3 pairs of long marginal bristles. Costal spine present, $r_1$ bare, $r_{4+5}$ with several hairs basally, $R_5$ open, $t_2$ with 2-3 ad, middle femora in ♂ without ctenidium. Abdominal tergites I+II without marginal bristles, tergite III with or without such bristles. Abdomen more or less distinct black spotted. ♂ genitalia protruding. Pregonite broad, postgonite narrow, hypophallus hooklet-formed, ventral arms big, protruding ventrally. ♀ with abdominal tergite VI complete and with tergites VII and VIII bilobate. 6 palaearctic species. Larvae are necrophagous, predacious, or facultative parasitoids of invertebrates.

**References:** Verves 1982: Fliegen palaearkt. Reg. 11 (64 h), Lf. 327: 295-296; 1985: dtto, Lf. 330: 297-303; Pape 1987: Fauna ent. scand. 19: 87-90.

### *Sarcophila latifrons* (Fallén, 1817)

K. Vetensk. Akad. Handl. (3) (1816): 238 *(Musca)*.

#### Description

♂. Frons 0.4-0.48 of head width. Head grey dusted, frontal vitta black in anterior part, broad, parallel-sided, at frons middle 2-2.6 times broader than one parafrontal. 3rd antennomere 1.6-2 times longer than 2nd. Antenna black, apical part of 2nd antennomere reddish. Parafacial at level of antennal base 0.2-0.25 and gena 0.22-0.31 eye heigth. 1-2 regular rows of postorbital bristles; vte well developed, ocellar bristles strong; parafacial with 2-3 irregular vertical rows of setae; gena and metacephalon with numerous black hairs.

Thorax grey or yellowish grey dusted, legs black, wings hyaline, basicosta yellow, epaulet yellowish brown to brown. ia 0+3, h 3-4, ph 1, npl 2, m-cu sigmoid. Abdomen grey or olive-grey, each tergite with elongate medial spot and with pair of rounded or slightly elongate lateral spots. Abdom-

inal tergites I+II without marginals, tergite III with marginals present or weak. Genitalia protruding, black, grey dusted.

♀. Like ♂, frontal vitta 2.5-3.3 times wider than parafrontal. Lateral spots on abdominal tergites small, occasionally somewhat reduced; terminalia reddish.

Body length 4-8.5 mm.

**Distribution:** Widely distributed in Europe, southern Siberia, central Asia and Transcaucasus. Flies occur in mesophytic bushland, feeding at flowers, faeces, carcases etc. Larvae develop in live and dead insects. – Orthoptera: *Gryllotalpa unispina* (Sychevskaya 1967); *Gomphocerus sibiricus, Locusta migratoria, Dociostaurus maroccanus* (Rohdendorf 1928), *Stauroderus scalaris* (Verves 1982b), *Chorthippus albomarginatus, C. longicornis* (Séguy 1941a); beetles (Coleoptera), Scarabaeidae: *Oryctes nasicornis* (Emden 1955), Tenebrionidae: *Blaps lethifera, B. halophila, Tentyria nomas* (Knor 1970), *Adesmia servillei schatzmayeri, Trigonoscelis punctipleuris, Pisterotarsa gigantea zoubkoffi* (Charykuliev & Nepesova 1972), in imagines of the silkworm moth *Bombyx mori* (Sychevskaya 1967) and (animal) carcasses (Sajo 1898, Séguy 1941a, Emden 1954, Syčevskaja 1967 etc.), reared from snail *Helix nemoralis* (Richet 1990), often causing cutaneous myiasis (Portschinsky 1876, Séguy 1941a).

### Genus *Wohlfahrtia* Brauer & Bergenstamm, 1889

Denkschr. Akad. Wiss. Wien 54: 123.
**Type species:** *Sarcophila magnifica* Schiner, 1862.

Brightly coloured (e.g. whitish grey, black spotted), big to medium-sized (5-17 mm) fly. Frons in both sexes broad, in ♂ with small and weak orbital bristles sometimes absent, in ♀ with strong proclinate or. Parafacial and gena broad, parafacial ventrally bare. Frontal vitta broad. Arista bare or micropubescent. 3rd antennomere 1-4 times longer than 2nd. Antenna and palpus reddish brown to black. Head silvery grey or yellowish dusted, frontal vitta black (Figs 157, 158). dc 2-3+2-4, npl 2. Scutellum with 3 pairs of strong marginal bristles, apical bristles absent or very weak. Propleuron bare, claws of pulvilli elongate in both sexes. Ctenidium on $f_2$ in ♂ present, $t_2$ with 2-5 ad. $R_5$ open, rarely closed at wing margin, $r_1$ bare, $r_{4+5}$ with some basal setae. Thorax grey dusted, stripes on mesonotum more or less distinct, legs black, grey pollinose, wings hyaline. Abdomen with black-spotted tergites, genitalia reddish to black. Cerci elongate, surstyli broad at apex, ventral arms well developed, hypophallus more or less protruding. ♀ with abdominal tergite VI complete, tergite VII complete or bilobate, spermatheca ovoid, not very elongate.

23 species are distributed in the Holarctic, Afrotropical and Oriental regions. Larvae are necrophagous, and some species are parasites of vertebrates including man.

**References:** Portschinsky 1916: Trans. Buro Ent. 9: 1-106; Salem 1938: Egypt. Univ. Fac. Med. 13: 1-90; Séguy 1941: Ann. Parasitol. 18: 221-232; Rohdendorf 1956: Ent. Obozr., 35: 201-229; Verves 1985: Fliegen palaearkt. Reg. 11 (64 h.), Lf. 330: 303-341; Verves & Kulikova 1986: Zool. J. 65: 1324-1331.

### Key to species of *Wohlfahrtia* B. B.

1. Basicosta brownish black to black. 3rd antennomere 1-1.3 times longer than 2nd. 1st, 2nd and basal part of 3rd antennomeres reddish, palpus yellow to yellowish brown. ♂ frons without proclinate or. Lower part of parafacial bare .................. *W. meigeni* (Schin.)

– Basicosta yellow to yellowish brown. 3rd antennomere 1.4-2 times longer than 2nd. Antenna black, sometimes 2nd antennomere reddish apically. Palpus brown with black apex. ♂ frons often with 1-2 weak or, lower part of parafacial often haired .................. *W. magnifica* (Schin.)

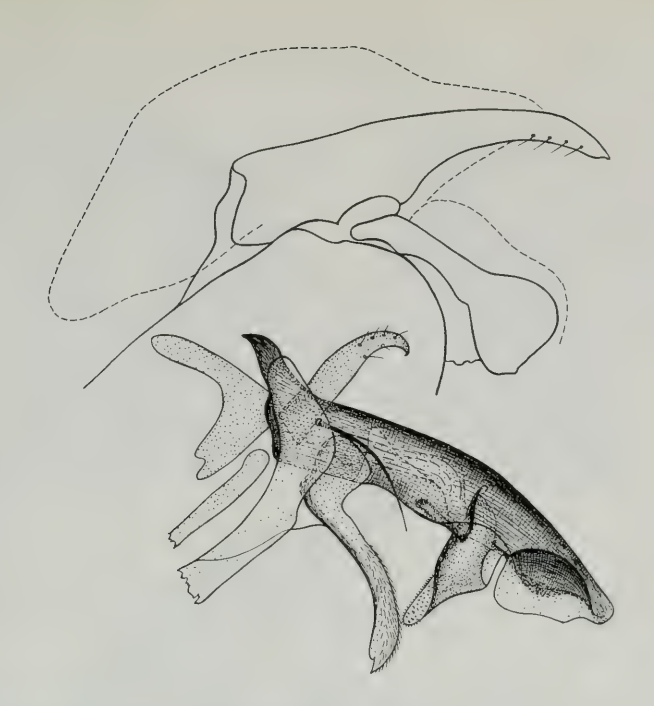


**Fig. 155.** *Wohlfahrtia magnifica.* Male genitalia, laterally (after Rohdendorf 1956).

### *Wohlfahrtia magnifica* (Schiner, 1862)

Fauna austr. Dipt. 1: 567 *(Sarcophila).*

**Description**

♂. Frons at narrowest part 0.31-0.4 and at antennal base 0.35-0.52 head width. Parafontal, parafacial and lunula silvery white dusted; gena and metacephalon grey pruinose. Frontal vitta black, posterior part grey dusted. Vitta at middle 1.2-1.6 times broader than parafrontal and widening 1.2-2 times dorsally. Antenna black, 3rd antennomere 1.4-2 times as long as 2nd, arista bare or shortly haired, inflated in basal 0.3-0.5. Palpus elongate, widened at apex, basal part reddish brown to brown, distally black. Parafacial at antennal base 0.26-0.35 and gena 0.45-0.68 eye height. One row of postorbital setae, vte well developed, ocellar bristles rather weak, or 0+0-2, weak, fr 6-12, situated at fore part of frons, these setae very small, numerous and hair-like in posterior part of frons; parafrontal and upper part of parafacial densely black haired; lower part of parafacial bare or with few hairs. Vibrissal ridge with several hairs above marginal vibrissae, gena and metacephalon densely black haired.

Pleura black, weakly dark grey dusted, mesonotum silvery grey or cinereous pale dusted, with 3 black longitudinal spots. Basicosta and epaulet yellow to yellowish brown; ac 2-4+4-5, dc 3+3-4, ia 0-1+2-3, h 3-4, ph 1, sa 2, spl 1-2+1. Discal bristles on scutellum weak (1-3 pairs). Costal spine very small, ratio between 3rd and 5th costal sections 1 : 0.36-0.54; m-cu sigmoid.

Abdomen conical. Tergite III without mediomarginals, tergites IV and V with row of mediomarginal bristles. Genitalia big (Fig. 155). Abdomen dense silvery white or cinereous white dusted with black spots, ventral abdominal part lustrous black, genitalia black, grey dusted. Central spots on tergites III and IV elongate, lateral spots rounded, all 3 spots on tergite V rounded and situated in its 0.3-0.4.

♀. Frons broad, 0.37-0.53 wider than head, frontal vitta at frons middle 1.4-1.7 times broader than one parafacial. or 1+2, strong. Costal spine well developed. Abdominal tergite VII divided into 2 lateral oval and bare sclerites, tergite VIII bilobate, each lateral lobe with 4 bristles. Genitalia black to brownish black.

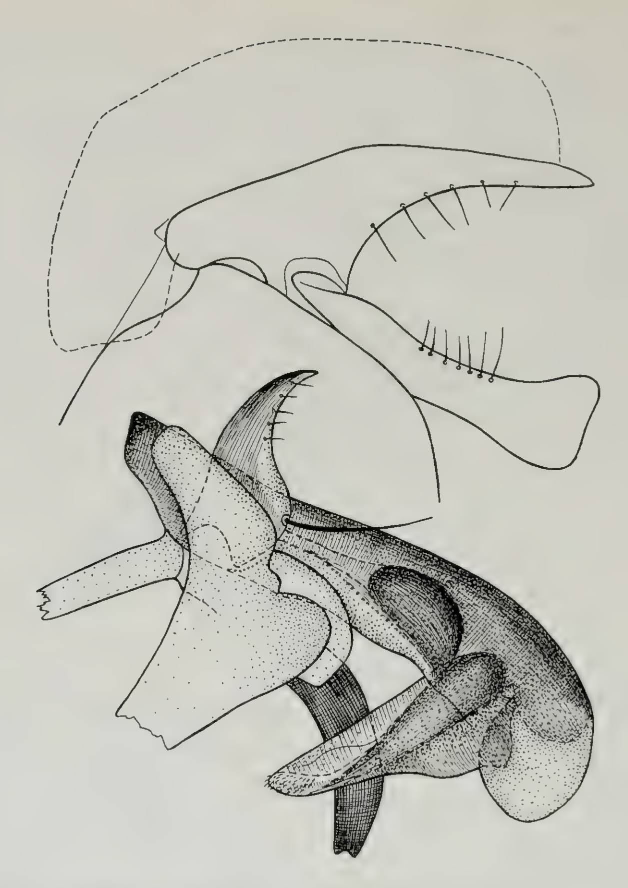


**Fig. 156.** *Wohlfahrtia meigeni*. Male genitalia, laterally (after Rohdendorf 1956).

Body length 5.5-14.5 mm.

**Distribution:** Widely distributed in southern Europe (northwards to Hungary and southern Slovakia) and east from North Africa to western Asia, central Asia, Mongolia, northwestern China and to East. Flies live in dry foreststeppes, arid habitats and semideserts, feeding at flowers. Males gather in hilltopping aggregations. Larvae are parasites in wounds of birds, mammals and man.

**References:** Akhmetov 1985; Condorelli 1914; Delanoe 1932; Gan 1953; Charykuljev 1962; James 1947; Patton 1922; Lehrer, Fromunda 1986; Portschinsky 1883-1884; Sychevskaya 1954; Ternovoy 1960; Treus et al. 1985; Valentyuk 1969.

### *Wohlfahrtia meigeni* (Schiner, 1862)

Fauna austr. Dipt. 1: 567 (*Sarcophila*).

*Paraphyto opaca* Coquillett, 1897. U.S. Dept. Agric. Tech., Ser. 7: 123.

**Description**

♂. Frons at narrowest part 0.30-0.34 and at antennal base 0.42-0.47 head width. Parafrontal, parafacial, lunula and posterior part of frontal vitta with dense silvery grey pollinosity; proximal part of frontal vitta and its medial portion grey or reddish brown, poorly dusted. Frontal vitta parallel, middle of frons 1.8-2.5 times broader than parafrontal. Gena and metacephalon grey pollinose. 3rd

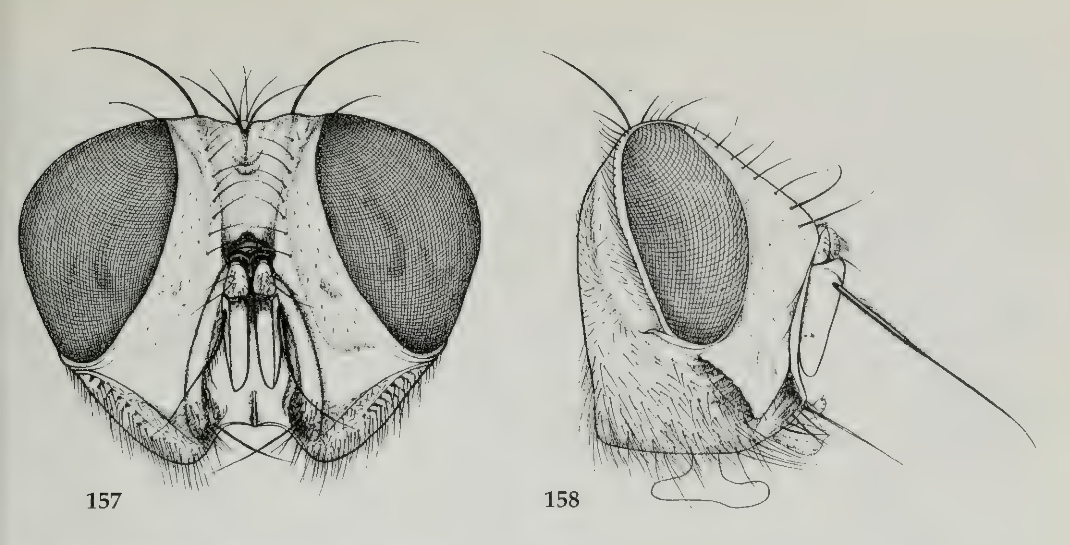



**Fig. 157.** *Wohlfahrtia (bella).* Male head frontally.
**Fig. 158.** *Wohlfahrtia (bella).* Male head laterally.

antennomere 1-1.3 times longer than 2nd, arista micropubescent, inflated in basal 0.3-0.4. 1st, 2nd and basal part of 3rd antennomeres reddish yellow, apical part of 3rd antennomere and arista brownish black to black. Palpus elongate, apex inflated, entirely reddish yellow. Parafacial at antennal base 0.28-0.36 and gena 0.32-0.6 head width. One row of postorbitals, vte well developed, ocellar bristles strong; or 1+0, fr 8-12 well developed in fore part; parafrontal and proximal part of parafacial densely haired, distal part of parafacial bare; gena and metacephalon densely black haired.

Pleura black, poor grey dusted, mesonotum grey pollinose, with 3 longitudinal black stripes, basicosta and epaulet brownish black to deep black, occasionally yellowish brown; ac 0+1-2, dc 2-3+3-4, ia 0-1+2-3, h 3-4, ph 1-2, sa 3, spl 1-2+1. Scutellum with 1-2 pairs of fine d.

All femora, middle and hind tibia show long and dense hairs ventrally, fore tibia with shorter but numerous ventral bristles, $t_2$ with 2-3 ad. Costal spine weak. Ratio between 3rd and 5th costal sections 1 : 0.44-0.58, m-cu vein sigmoid.

Abdomen conical. Tergite III without marginals, tergites IV and V with row of marginal bristles. Genitalia big (Fig. 156). Abdomen densely grey or silvery grey dusted with black spots. Genitalia black, grey dusted. Abdominal pattern rather similar to *W. magnifica*, but spots on tergite III often fused.

♀. Frons 0.37-0.45 head width; or 1+2, strong; costal spine well developed, genitalia black, sometimes with reddish hue. Lateral plates of tergite VII each with 2-4 strong bristles, on 8th segment with a row of marginal bristles.

Body length 6-14 mm.

**Distribution:** Widely distributed throughout the warm forest belt of the Holarctic region, but preference for loess, sandy or generally dry habitats. Flies feed at flowers and gather in hilltopping aggregations. Larvae are cutaneous and cavity parasites of frogs and toads – *Bufo vulgaris* Laur. (Čepelák 1952), *Rana semiplicata* Nyk. (Artamonov 1980, 1987), mammals, e.g. rats (Morrison 1937), rabbits, cats, dogs, foxes, American mink *(Mustela vison)* (Aabler 1961) and man (Aabler 1961, Stabler et al. 1962 etc.).

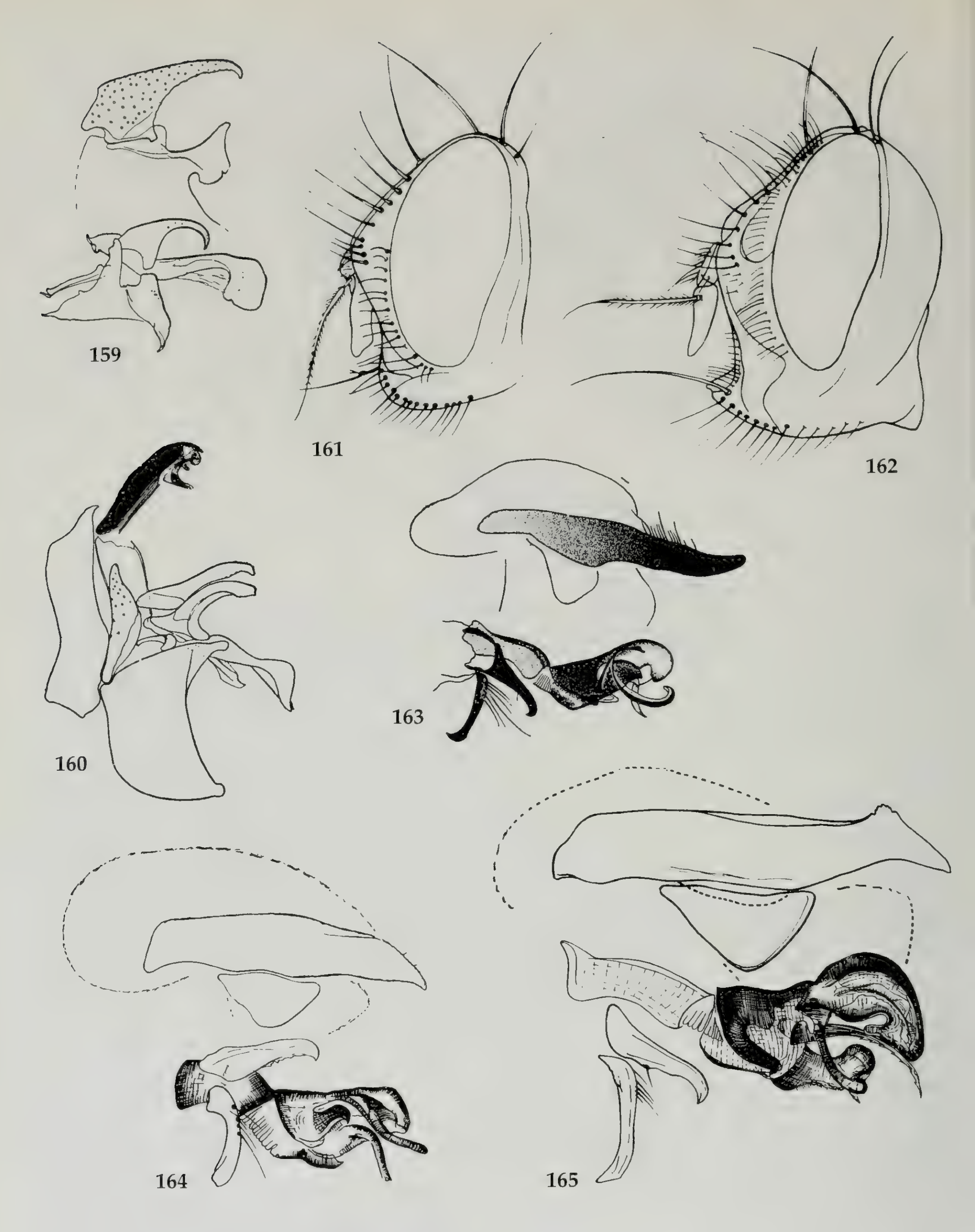


**Fig. 159.** *Brachicoma devia*. Male genitalia, laterally.
**Fig. 160.** *Tephromyia grisea*. Male genitalia, laterally.
**Fig. 161.** *Heteronychia rohdendorfiana*. Male head profile.
**Fig. 162.** *Heteronychia porrecta*. Male head profile.
**Fig. 163.** *Discachaeta arcipes*. Male genitalia profile.
**Fig. 164.** *Discachaeta pumila*. Male genitalia profile.
**Fig. 165.** *Discachaeta cucullans*. Male genitalia profile.

## Subfamily Sarcophaginae Macquart, 1835

Grey flies, small to stout (body length 3-22 mm). Arista plumose, chaetae and hairs distinctly longer than greatest diameter of arista, occasionally short-haired. ♂ eyes subholoptic, ♀ eyes dichoptic, proclinate orbital bristles in ♂ absent, hind head margin elongate, oral margin protruding, angular vibrissae well developed. Hind coxae (in Palaearctic species) with fine hairs on posterior suface. Notopleuron with 2 strong primary bristles, with 2 smaller subprimary bristles, and with or without additional hairs. Claws in both sexes elongate. Cell $R_5$ open, sometimes closed or petiolate. ♂ with abdominal sternites III and IV fully exposed. Abdomen with chequered pattern, sometimes with spots or unicolorous.

♂ postabdomen. Tergite VI almost entirely reduced being preserved in form of a paired perithreme around 6th stigmata, segment VII+VIII (syntergosternites) complete, without discal bristles. Styli shortened, bacilliform sclerite reduced. Sternite VI asymmetrical. Epiphallus absent in Palaearctic species (present in some American groups: Metoposarcophagina etc.). Aedeagus sometimes complete (Raviniini) but consisting usually of mobile articulated basiphallus and distiphallus. Paraphallus well sclerotized and supports (strengthens) distiphallus. It shows no processes except in *Helicophagella* a dorsal claw-like process ("auricula") is well developed. Acropahllus absent, hypophallus differentiated into several sclerites (internal parts of distiphallus) differing in various tribes. They (e.g. styli, parastyli, medial process, hillae, limen etc.) convey sperm into ♀ seminal receptacles.

A membrane is situated between the basiphallus and the distiphallus. This membrane forms inflations or processes called "membranal processes", or "vesica". This structure may be also unpaired or differentiated into several lobes.

The harpes are elongate paired processes situated between mambrane and distiphallus on ventral surface *(Thyrsocnema)*.

The ventral plates are derivatives of ventral process of Miltogrammatinae. They may be absent, fused or separate from paraphallus and show often an apical ventral process. These processes are called "harpes" by some authors (e.g. Pape 1987b etc.).

The apical plate is a membranous or sclerotized distal part of aedeagus. It can be complete, bilobate, with lateral arms etc. (called juxta according to Roback 1954). Apical plate and ventral plates expand the ♀ genital opening during copulation (Plate V).

Ovipositor short, abdominal tergites VII-X being partly or completely reduced or membranous, tergite VI complete or divided centrally into paired lateral lobe. In Protodexiini sternites VII and VIII are complete and more or less elongate forming a well sclerotized ovipositor.

1st instar larva. Medial sclerite (mandible) partly or completely reduced, clypeal arch present or absent. Spiracular plate in a deep little pit.

The femoral organ. Females of numerous sarcophagine species have a mid-femoral secretory organ (Plate IV). It is an elongate patch without pollinosity and chaetae situated on posterior surface of mid femur. Its size and situation are important for ♀ identification (Pape 1987b).

More than 1600 sarcophagine species are known worldwide. About 400 taxa occur in the Palaearctic region. Larvae are necro-coprophagous (*Bercaea, Ravinia, Helicophagella* etc.) with strong trends towards predation and/or parasitism of various arthropods and snails, occasionally living in flesh, wounds or causing myiases in vertebrates. Some groups are nearly obligatory parasites of earthworms *(Sarcophaga)*, gastropod molluscs (Heteronychiina), grasshoppers (Protodexiini), predators or parasitoids of lepidopterous (bombyciform) larvae (some Parasarcophagina) and of egg-sacs of spiders (*Arachnidomyia*).

In the genera *Ravinia, Bellieriomima, Helicophagella, Krameromyia, Pierretia, Sarcotachinella, Thyrsocnema, Heteronychia, Bercaea, Parasarcophaga, Liosarcophaga, Robineauella, Sarcophaga* the larvae may generally develope (and were partly successfully reared) on beef meat, snails, insects including edaphic insect larvae (own results and Richet 1990).

**References:** Rohdendorf 1937: Fauna SSSR 19, 1: 1-501; 1965: Ent. Obozr. 44, 3: 676-695; Séguy 1941: Encycl. ent. A 21: 55-212; Baranov 1942: Vet. Arhiv, 12: 497-659; Kano et al., 1967: Fauna japon. 7: 1-168; Mihályi 1979: Fauna hung. 135 (16): 105-152; Pape, 1987: Fauna ent. scand. 19: 100-181; Verves 1989: Mem. Inst. Oswaldo Cruz 85 (4): 529-545.

### Key to the tribes of Sarcophaginae

1. Frontal bristle row not diverging forwards. Aedeagus complete. (Plate V) Internal parts of distiphallus with paired petiolate process (hilla). Apical plate generally absent, membranal process absent, ventral plates elongate, well sclerotized ........ Raviniini
– Frontal bristle row distinctly diverging at lunula level ........ 2.

2. Postsutural ac bristles 2-5 pairs. Apical part of cerci in ♂ strongly curved dorsally. Membranal lobe small. Internal parts of distiphallus with paired cone-formed or elongate process (limen). ♀ with abdominal sternites VII and VIII complete and forming more or less elongate ovipositor. 1st instar larva without clypeal arch ........ Protodexiini
– Postsutural ac bristles 0-1 pair. Limen absent ........ 3.

3. Membranal process and ventral lobes well developed, elongate and well sclerotized (Fig. 211). The single palaearctic genus *Sarcotachinella* shows an oblong patch of golden hairs on distal anterior surface of mid femora ........ Johnsoniini
– Membranal process and ventral lobes of various size and form and variously sclerotized, rarely absent ........ Sarcophagini

### Tribe Protodexiini Townsend, 1912

Jl. N.Y. ent. Soc. 20: 117.

*Tephromyiini* Townsend, 1919, Proc. U. S. Natn. Mus. 56: 544
*Blaesoxiphina* Rohdendorf, 1965, Ent. Obozr. 44: 676

Small to medium-sized species. ♂ frons narrower than eye, without proclinate or. Postsutural ac 2-5 pairs. 3rd antennomere 1.2-3 times longer than 2nd; arista long plumose, occasionally short-haired. Postsutural dc 3, occasionally 4 pairs. Cercal prongs abruptly curved dorsally, terminating often as small hooklet. Membranal process small, membranous, lateral plate absent. Internal part of distiphallus with paired conical or elongate process (limen) and with pair of bristle-like styli. ♀ with abdominal tergite VI complete, tergites VII and VIII fused, forming a well sclerotized ovipositor of various forms. Flies grey coloured, abdomen dark spotted or with dark stripes, pattern chequered.

The tribe comprises 14 genera and about 180 species. In the Palaearctic region 5 genera and about 70 species occur. Adult flies frequent grassland and sandy areas.

Larvae are endoparasites of various orthopterans and other insects (Coleoptera, Mantodea), feeding on fat body and sucking haemolymph of the hosts. The kinds of hosts invaded vary with the individual species.

**References:** Rohdendorf 1928: Publ. Uzb. Expl. Sta. Plant Prot. 14: 1-66; 1932: Bull. Plant Prot. 1(3): 171; Lopes 1971: Rev. bras. biol. 31, 1: 3-13; Verves 1985: Fliegen palaearkt. Reg. 11, 64 h., Lf. 330: 350-440; Léonide & Léonide 1986: Les diptères sarcophagidés français, Univ. Province, 301 pp.

### Key to the genera of Protodexiini

1. Abdomen with dark chequered pattern without distinct spots or bands. Apical part of ♂ cerci with numerous hairs, spines completely absent or present on cercus tip only. ♀ ovipositor elongate ........ *Servaisia* R.-D.
– Abdomen with distinct black spots or bands, colourless or slightly iridescent, or abdomen completely yellowish grey pollinose. Apical part of ♂ cerci with numerous spines, hairs absent. Ovipositor either elongate or short ........ 2.

2. ♂: Apical plate of distiphallus absent, paraphallus elongate and reaching to tip of aedeagus. ♀: Ovipositor with base very broad ........ *Tephromyia* B. B.

– ♂: Apical plate well developed, paraphallus shorter and not reaching tip of aedeagus. ♀: Ovipositor of another form ........ *Blaesoxipha* Löw

## Genus *Blaesoxipha* Loew, 1861

Wien. ent. Monatschr. 5: 384.
**Type species:** *Blaesoxipha grylloctona* Loew, 1861

Flies small to medium-sized (3-12 mm). Narrowest part of ♂ frons 0.1-0.22, in ♀ frons 0.28-0.36 of head width. 3rd antennomere 1.2-3 times as long as 2nd, arista inflated in basal 0.2-0.4, long pubescent. Facial ridge haired at 0.2-0.3 of lower part. Parafacials and genae medium-width, haired. Usually 2-4 postsutural ac, occasionally one pair, 3 postsutural dc. Propleuron bare. Scutellum with well developed long and strong subap and bas, ap in ♂ well developed, in ♀ usually absent. Mid femora in ♂ with ctenidium, in ♀ without femoral organ, mid tibia with 2-3, occasionally with one ad and one av. $R_5$ open, sometimes closed. $r_1$ bare, $r_{4+5}$ with some basal setae.

♂ genitalia rather small. Apical part of cerci dorsally abrupt curved with numerous spines, without hairs. Surstyli elongate, triangular. Paraphallus elongate, rarely quadrate, e.g. in *B. redempta*. Ventral processes well developed, sometimes membranous, small (e.g. *B. grylloctona, B. plumicornis*). Limen big, apex rounded or pointed, styli well developed, bristle-like. Apical plate membranous, elongate, apex often with pair of short lateral protuberances.

♀ with abdominal tergite VI complete, tergite VII usually absent or membraneous, tergite VIII well developed, consisting usually of a pair of lateral triangular plates, tergite X small, membraneous with one pair setae, cerci elongate, haired. Sternite X well developed, haired. Sternites VII and VIII fusing to from ovipositor. The genus comprises about 50 species, 31 occurring in the Palaearctic region. All are parasitoids of Orthoptera. The females are engaged in a complicated oviposition behaviour.

**References:** Rohdendorf 1937: Fauna SSSR 19, 1: 87-123; Verves 1985, Fliegen palaearkt. Reg. 11, 64 h., Lf. 330: 375-422 (revisions).

### Key to the species of *Blaesoxipha*

1. ♂♂ ........ 2.
– ♀♀ ........ 8.

2. Limen claw-like, tip narrowed and pointed ........ 3.
– Limen quadrate, oval or clavate ........ 5.

3. Cercus in dorsal view apically spoon-shaped, widened. Ventral processes bilobate ........ *B. cochlearis* (Pand.) (Fig. 129).
– Cercus at apex without spoon-shaped dilatation. Ventral processes complete ........ 4.

4. Apical part of cercus rectangulate curved dorsally ........ *B. redempta* (Pand.) (Fig. 135)
– Apical part of cerci moderately curved dorsally ........ *B. ungulata* (Pand.) (Fig. 148)

5. Angle between apical and basal part of cercus acute or 90°. Apical part of cercus with a broad dorsal keel ........ *B. occatrix* (Pand.) (Fig. 132)
– Angle between apical and basal part of cercus obtuse. Cercus without dorsal keel ........ 6.

6. Cercus flattened to form a transverse plate. Palpi pale brown to yellowish apically ........ *B. pygmaea* (Zett.) (Fig. 134)
– Cercus not flattened to form a transverse plate. Palpi fuscous to black ........ 7.

7. Apical part of cercus narrow: broadest at base and gradually tapering ........ *B. plumicornis* (Zett.) (Fig. 133)
– Apical part of cercus broader and greatest width distal to base ........ *B. grylloctona* Lw.

8. Ovipositor short, spatulate, not projecting over the end of tergite VI ................................................ *B. redempta* (Pand.) (Fig. 138)
– Ovipositor elongate and projecting beyond the end of tergite VI ..................................................... 9.

9. Ovipositor centrally strongly curved (right-90°-angle), its apical part triangulate, apex pointed .. ........................ *B. occatrix* (Pand.) (Fig. 144)
– Ovipositor obtusely curved or nearly straight ................................................................................ 10.

10. Ovipositor rather elongate and broad, sabre-like ...................................*B. grylloctona* Lw. (Fig. 136)
– Ovipositor short, not sabre-like ..................................................................................................... 11.

11. Ovipositor apically pointed or narrowly rounded ........................................................................ 12.
– Ovipositor apically broadly rounded ............................................................................................... 13.

12. Ovipositor apically obtuse and moderately inflated .......................... *B. plumicornis* (Zett.) (Fig. 143)
– Ovipositor in dorsal view gradually tapering in apical part ................. *B. pygmaea* (Zett.) (Fig. 142)

13. Ovipositor with tip strikingly narrow ................................................. *B. ungulata* (Pand.) (Fig. 151)
– Ovipositor with tip moderately narrow ............................................... *B. cochlearis* (Pand.) (Fig. 130)

## *Blaesoxipha cochlearis* (Pandellé, 1896)

Revue Ent. 15: 205 *(Sarcophaga)*.

**Description**

♂. Frons at narrowest part 0.16-0.20, at vertex 0.21-0.25 and at antennal base 0.29-0.34 head width. Frontal vitta 2-2.5 times as wide as parafrontal, widening 1.4-2.1 times forward. 3rd antennomere 1.7-2.2 times as long as 2nd. Parafacial at level of antennal base 0.18-2.2 and gena 0.21-0.28 eye height. One row of postor, vte short, hair-like, ocellars long, fr 7-10, strong and crossed, parafrontals with numerous long erect hairs, parafacials with one row of fine bristles. Genae and upper part of occiput black setose, lower part of occiput with long white hairs. Parafrontal, parafacial and lunula silvery white dusted with yellowish tinge, frontal vitta black or brownish grey, almost without pollinosity, vertex fuscous, occiput and gena grey dusted, antenna and palpi black, distal part of 2nd antennomere usually reddish brown.

Thorax densely bright grey pollinose, mesonotum yellowish, black longitudinal stripes well developed, moderately wide. Legs black. ac 2-4+1-3, dc 3-5+3, ia 0-1+2-3, h 3-4, ph 2-3, npl 2 long and 2-3 short, spl 2+1 or 1+1+1. Propleuron mostly bare, but occasionally with several short chaetae. Ratio between 3rd and 5th costal sections 1 : 0.7-1.2. Abdominal tergite III with pair of mediomarginals, or without these. Segments VII+VIII with row of marginals. Genitalia small (Fig. 129). Angle between apical and basal parts of cercus obtuse, cerci with apex dorsally spatulate, broadened. Pregonite curved, broad, blade-like, postgonite narrow, almost straight. Paraphallus elongate, 2 times longer than wide, ventral lobes bidentate, limen claw-like, shorter than apical plate which is elongate, and without lateral protuberances, broad, apex pointed, curved ventrally. Genitalia reddish brown, densely dusted, occasionally fuscous to black.

♀. Frons 0.28-0.35 head width, frontal vitta almost parallel, 1.2-1.7 times as wide as parafrontal. vte long and strong. Only one pair of postsutural ac. Ovipositor (Fig. 130) moderately long, slightly curved, apex broadly rounded. Longitudinal stripes of mesonotum poorly developed, ovipositor brown or yellowish brown, slightly pollinose.

Body length 5-8.5 mm.

**Distribution:** South and central Europe, North Africa, Transcaucasus, Middle East, central Asia, southern Siberia and Far East.

**Ecology:** Adult flies frequent mesophytic open habitats. Larvae are parasitoids of Tettigonidae: *Barbitistes fischeri, Decticus albifrons, Ephippiger ephippiger* (Léonide & Léonide 1972), *Gampsocleis schelkovnikovae* Ad. (Olsufjev 1929), *Pholidoptera chabrieri, Platycleis denticulata, Tettigonia viridissima* (Léonide

& Léonide 1972); Gryllidae: *Gryllus* sp. (Léonide & Léonide 1972) and Acridiidae: *Eirenephilus longipennis* SH. (Verves 1985).

### *Blaesoxipha grylloctona* Löw, 1861

Wien. ent. Ztg. 5: 386.

*laticornis* Pape, 1987. Fauna ent. scand. 19: 108 *(Blaesoxipha)* (misidentification: not *Sarcophaga laticornis* Meigen, 1826).

**Description**

♂. Frons at narrowest part 0.14-0.18, at vertex 0.2-0.23 and at antennal base 0.25-0.33 head width. Frontal vitta 2.5-3 times as wide as parafrontal, 1.8-3 times wider forward. 3rd antennomere 1.3-2.1 times as long as 2nd. Parafacial at antennal base 0.2-0.25 and gena 0.2-0.28 eye height. 1-2 regular rows of postor, vte poorly developed, fr 9-16, strong and crossed. Parafrontal and upper part of parafacial with numerous black setae, lower part of parafacial with one vertical row of medium-length bristles. Gena and upper part of occiput black haired, lower part of occiput with long yellowish white setae. Head densely bright dusted, parafrontal and facial greyish white pollinose. Frontal vitta dull black, gena and occiput grey pollinose, antenna and palpi black.

Thorax fuscous, dark grey dusted, mesonotum with broad black elongate stripes, legs black. ac 3-4+2-4, dc 3+3, ia 1+2-3, h 3, ph 2, npl 2 long + 2 short, spl 2+1. Propleuron bare. Ratio between 3rd and 5th costal sections 1 : 1.1-1.2. Abdominal tergite III with elongate mediomarginals. Genitalia small (Fig. 131). Apical part of cercus broad, broadest being distally as in *B. plumicornis*. Paraphallus short, ventral lobes very small, membranous, apical plate elongate, with pair of short lateral lobes. Limen elongate, conical, strongly prolonged ventrally. Abdomen silvery grey or yellowish grey dusted with black pattern. Tergite I+II almost completely grey, tergites III and IV each with 3 elongate spots, pattern on tergite V poorly developed. Genitalia lustrous black, occasionally brownish.

♀. Frons 0.28-0.33 of head width. Frontal vitta almost parallel-sided, 1.5-1.8 times as wide as one parafrontal. vte long and strong, fr 5-8. Abdominal tergite III with or without short mediomarginals. Ovipositor in lateral view (Fig. 136) compressed to form a sabre-like blade, distinctly protruding caudally. Thorax densely pale grey dusted, longitudinal stripes poorly developed, abdominal pattern more or less reduced. Ovipositor lustrous brown to blackish brown.

Body length 4.5-8.5.

**Distribution:** France, Italy, Bulgaria, Germany, Denmark, Sweden, Finland, Czechia, Poland, Western Russia (St. Petersbourgh region), Ukraine, Kazakhstan, southern Siberia, Tadjikistan, Buryat, Primorje, Mongolia, China, Korea and Japan. The flies favour mesophytic habitats. Larvae are parasitoids of grasshoppers: *Chorthippus biguttulus, Ch. brunneus* Thunb., *C. mollis* Charp., *C. parallelus* Zett., *Omocestus centralis* Zett. (Richards & Waloff 1948, Parmenter 1950, Léonide & Léonide 1982b).

### *Blaesoxipha occatrix* (Pandellé, 1896)

Revue Ent. 15: 178 *(Sarcophaga)*.

*zachvatkini* Rohdendorf, 1937. Fauna SSSR 19, 1: 95 *(Blaesoxipha)*.
*rohdendorfi* Jacentkovský, 1941. Časopis Čs. spol. ent. 37: 84 *(Blaesoxipha)*.

**Description**

♂. Frons at narrowest part 0.14-0.17, at vertex 0.18-0.23 and at antennal base 0.35-0.45 head width. Frontal vitta 2.4-4.0 times as wide as one parafrontal, 1.7-2.5 wider forwards. 3rd antennomere 1.5-2.2 times as long as 2nd. Parafacial at level of antennal base 0.2-0.24 and gena 0.22-0.3 eye height. One regular row of postor, vte absent, ocellars strong, fr 8-10, long and crossed. Parafrontal with erect hairs, parafacial with one vertical row of short bristles, lower part of occiput with dense, long yellowish white hairs. Head densely silvery grey, pollinose, frontal vitta and vertex dull black, antenna and palpus black, distal part of 2nd antennomere often reddish. ac 2-3+2-3, dc 3-4+3, ia 1+3, h 3-4, ph 2-3,

sa 3, npl 2 long + 2-3 short, spl 2+1. Scutellum with short, crossed ap. Propleuron bare. Ratio between 3rd and 5th costal sections 1 : 0.9-1.2. Thorax dark grey pollinose, longitudinal stripes on mesonotum well developed and broad. Legs black. Genitalia medium-sized (Fig. 132). Angle between apical and basal parts of cerci obtuse, apical part with broad dorsal keel. Paraphallus 1.5 times (or less) as long as broad. Ventral lobes well developed, triangulate, with two dents at apex, apical plate elongate and narrow, almost straight, limen elongate, apex narrowly rounded, distinctly protruding. Abdomen densely whitish grey dusted with dark chequered pattern and with medial longitudinal black stripe on tergites I+II-IV, tergite V with poorly developed stripe; genitalia lustrous black or reddish brown.

♀. Frons 0.3-0.35 of head width, frontal vitta parallel-sided, 1.2-1.7 times as broad as one parafrontal; vte strong, fr 7-10, ac 2-4+1. Abdominal tergite III with or without fine mediomarginal bristles. Ovipositor triangulate, distinctly curved in middle, apex pointed (Fig. 144). Thorax grey dusted, longitudinal stripes narrow, abdomen grey pollinose with slight chequered pattern, tergites III and IV with grey longitudinal stripe and with paired grey spots. Ovipositor lustrous reddish yellow or yellowish brown.

Body length 6.5-10.5 mm.

**Distribution:** France, Italy, Czechia, Moravia, Hungary, Switzerland, Russia (St. Peterbourgh, Irkutsk and Chita regions), Kazakhstan, Mongolia and northwest China.

**Ecology:** Usually in mesophytic habitats. An obligatory parasitoid of the acridoid grasshopper *Podisma pedestris* L. The female inplants larvae by means of the ovipositor through the anus of the host (Zakhvatkin 1954).

### *Blaesoxipha plumicornis* (Zetterstedt, 1859)

Dipt. Scand. 13: 6153 *(Miltogramma)*.

*Musca lineata* Fallén, 1817. Kgl. Vetensk. Akad. Habdlg. (3) 1816: 238 (nom. praeocc. by Harris 1776 and Fabricius 1781).
*Sarcophaga gladiatrix* Pandellé, 1896. Revue Ent. 15: 205.
*Blaesoxipha lineata* auct. (nec *Sarcophaga lineata* Meigen, 1826).

#### Description

♂. Frons at narrowest part 0.11-0.18, at vertex 0.17-0.22 and at antennal base 0.27-0.36 head width. Frontal vitta 1.8-2.5 times as wide as parafrontal, 1.7-2.5 times wider forwards. 3rd antennomere 1.4-2 times as long as 2nd. Parafrontal at level of antennal base 0.15-0.21 and gena 0.18-0.28 eye heigth. One regular row of postor, vte poorly developed, fr 8-13, strong and crossed. Parafrontal and upper part of parafacial shortly haired, lower part of parafacial with one row of medium-length bristles, lower part of occiput with long and dense yellowish white hairs. Head silvery grey or yellowish grey pollinose, frontal vitta dull black to deep brown, almost without pollinosity, antenna and palpus black, 2nd antennomere often reddish at distal part. ac 2-4+2-4, dc 2-3+3, h 3-4, ph 1-3, sa 2-3, npl 2 long +2-4 short, spl 2+1, or 1+1+1. Propleuron bare. Ratio between 3rd and 5th costal sections 1 : 1-1.3. Pleurae black, slightly yellowish grey pollinose, mesonotum dark grey or yellowish grey dusted, longitudinal stripe distinct, only lateral being sometimes less developed, legs black. Abdominal tergite III with one or two pairs of medio-marginals, these occasionally indistinct. Genitalia small (Fig. 133). Apical part of cercus narrow and gradually tapering in lateral view. Aedeagus like in *B. grylloctona*, but limen wider and short. Abdomen with dense silvery grey or yellowish grey pollinosity, chequered pattern almost entirely absent. Tergite I+II lustrous black, tergites III and IV with narrow longitudinal black stripe and with indistinct paired lateral spots. Tergite V strongly dusted, with indication of longitudinal stripe. Segment VII+VIII dark, densely grey dusted, epandrium and genitalia reddish brown to black, slightly lustrous, fine dusted.

♀. Frons 0.26-0.32 head width, frontal stripe parallel-sided, 1.2-1.5 times as wide as parafrontal, vte strong, fr 5-9, ac 2-3+1-2. Abdominal tergite III often without mediomarginals. Ovipositor slightly protruding under tergite VI, its apex obtuse and moderately inflated (Fig. 143). Head densely yellowish grey pollinose, longitudinal stripes poorly developed. Abdomen with distinct but slightly chequered pattern, often more or less reduced. Ovipositor lustrous reddish brown to blackish.

Body length 4.5-9.0 mm.

**Distribution:** A widely distributed palaearctic species ranging from the British Isles to Mongolia, North China, Korea and Japan. The species is eurytopic, inhabiting meadows, glades, steppe-like hatitats and arid semideserts.

**Ecology:** Adults have been reared from acridoid grasshoppers (see e.g. Léonide & Léonide 1979, Verves 1985). The larvae are injected by the ♀ host through genital aperture (Olsufjev 1926, Rukawishnikow 1931).

## *Blaesoxipha pygmaea* (Zetterstedt, 1845)

Dipt. Scand. 3: 1302 *(Sarcophaga).*

*Blaesoxipha berolinensis* Villeneuve, 1912. Annls. hist.-nat. Mus. natn. hung. 10: 612.

### Description

♂. Frons at narrowest part 0.15-0.19, at vertex 0.2-0.25 and at antennal base 0.28-0.35 head width. Frontal vitta 3-4 times as wide as parafrontal, 1.3-1.7 times wider forward. 3rd antennomere 1.4-1.8 times as long as 2nd. Parafacial at level of antennal base 0.16-0.25 eye height. One regular row of postor, vte short. hair-like, ocellars long and strong, fr 7-11, long and crossed. Parafrontal short haired, parafacial with 1-2 vertical rows of fine short setae; occiput in lower part with long and dense yellowish white hairs. Head densely yellowish grey dusted, frontal vitta and vertex black, almost without pollinosity, antenna reddish brown, palpus basally fuscous to blackish, apical part reddish brown to yellow. ac 2-4+3-4, dc 3-4+3, ia 0-1+2-3, h 3-4, ph 2-3, sa 2-3, npl 2 long +2-3 short, spl 2+1. Propleuron bare. Ratio between 3rd and 5th costal sections 1 : 0.9-1.2. Thorax slightly pollinose, yellowish grey dusted, longitudinal stripes on mesonotum narrow but distinct. Legs black. Abdominal tergite III without medio-marginals. Genitalia small (Fig. 134). Angle between basal and apical parts of cercus obtuse, apical part moderately wide, blade-like, flattened to form a transverse plate, in dorsal view broadest centrally and distally. Pregonites apically with a lateral dent. Paraphallus twice as long as broad. Ventral lobes small, triangulate. Apical plate elongate with pair of short lateral arms. Limen elongate, moderately wide, tip rounded. Abdomen densely grey pollinose with dark chequered pattern. Tergites III and IV with broad black longitudinal stripe and with similarly coloured paired lateral spots, pattern on tergite V rahter reduced. Genitalia brownish black with fine bright dusting.

♀. Frons 0.28-0.31 head width. Frontal vitta almost parallel-sided, 1.5-2 times as broad as one parafrontal, vte long and strong, fr 5-9. All abdominal tergites without mediomarginal bristles. Ovipositor (Figs 141, 142) protruding under tergite VI, in lateral view pointed apically, slightly curved ventrally, tapering gradually in dorsal view. Body very densely grey to yellowish grey pollinose; antenna reddish yellow, apical part of 3rd antennomere and arista greyish black. Longitudinal stripes of mesonotum poorly developed. Femora and tibiae brownish to yellowish brown. Abdomen very densely grey or yellowish grey pollinose, pattern and chequered spots almost entirely absent. Tergite VI usually reddish, pale dusted. Ovipositor lustrous orange yellow to brownish yellow.

Body length 4-7 mm.

**Distribution:** France, Denmark, Sweden, Germany, Czechia, Poland, Yugoslavia, Russia (e.g. district of Orenburg and Chita), Kazakstan, Georgia, Azerbaijan, central Asia, Mongolia, China (Dzhungarian Basin) and Pakistan.

**Ecology:** Flies frequent mesophytic open habitats and steppes. Females deposit larvae between the genital appendages of acridoid grasshoppers: *Ailopus strepens* Latr. (Léonide 1961) (Léonide & Léonide 1975), *A. thalassinus* F., *Chorthippus brunneus* Thnbg. (Verves 1985), *Ch. biguttatus* L., *Ch. mollis*, (Léonide & Léonide 1971), *Locusta migratoria* L., *Oedaleus decorus* Germ. (Verves 1985), *Schistocerca gregaria* Forsk. (Rohdendorf 1937), *Dociostaurus maroccanus* Thnb. (Léonide 1983).

### *Blaesoxipha redempta* (Pandellé, 1896)

Revue Ent. 15:177 *(Sarcophaga).*

*Blaesoxihpa lineata* auct. nec Fallén, 1817.
*Blaesoxipha agrestis* auct. nec Robineau-Desvoidy, 1863.
*Blaesoxipha campestris* Verves, 1986 (erroneous citation of *B. agrestis*).

**Note.** According to Lopes (1953) the genus *Listeria* Robineau-Desvoidy, 1863 (type species *L. agrestis*) is a nomen dubium and not a clear synonym of *Blaesoxipha*.

According to Pape (1994) *Blaesoxipha redempta* (Pandellé 1896) is a species known only from France. The species living in central Europe is *Blaesoxipha lapidosa* Pape, 1994 (holotype comes from Hungary).

**Description**

♂. Frons at narrowest part 0.14-0.2, at vertex 0.17-0.23 and at antennal base 0.26-0.4 head-width. Frontal vitta 2.5-4 times as wide as parafrontal, 1.4-2 times wider forwards. 3rd antennomere 1.4-2.2 times as long as 2nd. Parafacial at level of antennal base 0.16-0.25 and gena 0.21-0.35 eye height. One regular row of postor, vte poorly developed. oc long and strong, fr 8-4, strong and crossed. Parafontal and upper part of parafacial with numerous black setae, lower part of parafacial with 1-2 vertical rows of moderately long bristles, lower part of occiput with long and dense yellowish white hairs. ac 3-4+3-5, dc 3-4+3, ia 0-1+2-3, h 3-5, ph 2-3, sa 2-3, npl 2 long + 2 short, spl 2+1. Propleuron bare. Ratio between 3rd and 5th costal sections 1 : 0.8-1.2. Abdominal tergite III with pair of mediomarginals. Genitalia small (Fig. 135). Apical part of cercus broad, angle between apical and basal part about 90°. Paraphallus short, limen apically pointed, ventral lobes broad and protruding, apical plate membranous, dorsally curved, with paired short lateral protuberances. Body bright and densely pollinose. Parafrontal and parafacial silvery white dusted, frontal vitta grey to brownish grey, almost without pollinosity, gena and occiput slightly grey dusted, antenna and palpus black. Thorax slightly grey pollinose, mesonotum with yellowish hue, longitudinal stripes black, medium-width, legs black. Abdomen slightly yellowish grey dusted, with pale chequered pattern and with medial black stripe. Lateral dark spots poorly visible. Genitalia slightly pale dusted, brownish black to reddish brown.

♀. Frons 0.22-0.31 of head width. Frontal vitta parallel-sided, 1.1-1.3 times as broad as parafrontal; vte long and strong. Ovipositor (Figs 137, 138) short and broad, apex narrow, sternite VIII with 2-3 pairs of very strong lateromarginals. Ground coloration rather bright. Frontal vitta more or less densely pale pollinose, apical part of 2nd antennomere reddish. Dark spots and stripes poorly developed on abdomen, genitalia reddish brown to brownish black, moderately dusted.

Body length 6-10.5 mm.

**Distribution:** Widely distributed in southern and central parts of the Palaearctic region and in northern part of the Afrotropical region. Flies are zonally indifferent frequenting both sandy areas and dry grassland with bushes.

**Ecology:** Larvae are parasitoids of Acridoidea and occasionally Tettigonoidea (list of hosts see Verves 1985). Additional host is *Primnoa primnoides* (Ikon.) (Artamonov 1985). This species has been introduced into Hawaii as a control agent for the pest *Schistocerca nitens* Thnb., but failed (Chong 1968, Hardy 1981). Females larviposit at random on flying hosts, the larvae penentrating through the intersegmental membrane (Baranov 1925, Olsufjev 1929, Léonide & Léonide 1971 etc.).

### *Blaesoxipha ungulata* (Pandellé, 1896)

Revue Ent. 15: 204 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.15-0.18, at vertex 0.2-0.25 and at antennal base 0.32-0.41 head width. Frontal vitta 2-2.5 times as broad as parafrontal and 1.5-2.5 × wider forwards. 3rd antennomere 1.2-1.6 times as long as 2nd. Parafacial at level of antennal base 0.24-0.31 and gena 0.26-0.38 eye height. One row of postor, vte prolonged and fine, oc numerous, long and fine, hair-like, fr 10-14, strong and crossed. Parafrontal with numerous elongate black hairs, parafacial with 2-3 rows of medium-length

bristles. Occiput in lower part with long bright brown hairs. Head dark, silvery grey dusted, frontal vitta black or brownish black, without pollinosity. Antenna and palpus black, apical part of 2nd antennomere often brownish. ac 2-4+2-4, dc 3-4+3, ia 1+3, h 3-5, ph 3, sa 3, npl 2 long + 2 short, spl 2+1 or 1+1+1. Ctenidium well developed. Ratio between 3rd and 5th costal sections 1 : 1.1-1.3. Thorax deep dark yellowish grey dusted. Longitudinal stripes on mesonotum black and broad, legs black. Abdominal tergite III with pair of very strong and long mediomarginals. Genitalia small (Fig. 148). Apical part of cercus very narrow, angle between apical and distal part obtuse. Paraphallus elongate, 1.5-2 times as long as broad, limen with apex pointed, ventral lobes poorly sclerotized, very broad, apical plate broad, rostrum-formed, without lateral protuberances. Abdomen dark grey or yellowish grey dusted, pattern dark chequered, tergites III and IV with 3 black elongate spots. Genitalia black or brownish black, lustrous, very finely pale dusted.

♀. Frons 0.27-0.32 head width. Frontal vitta parallel-sided, 1.2-1.6 times as broad as parafrontal, vte and oc long and strong, fr 6-10. One vertical row of parafacial bristles. Lower part of occiput with dense yellowish white hairs. Ovipositor (Fig. 151) in lateral view strongly curved ventrally, apex rounded, base of ovipositor both dorsally and ventrally inflated and tapering apically, triangulate, its end dorsally spatulate. Abdominal spotting poorly developed. Ovipositor black with base pale dusted, apex lustrous.

Body length 6-9.5 mm.

**Distribution:** Widely distributed in central and southern Europe, North Africa and Transcaucasus. Flies frequent usually montane (alpine) meadows but are found also in mesophytic bushy formations at lower elevations. Larvae are parasitoids of Tettigonoidea: *Barbitistes fischeri* Yers. (Léonide & Léonide 1971) and *Tettigonia viridissima* L. (Séguy 1941).

## Genus *Servaisia* Robineau-Desvoidy, 1863

Hist. Nat. 2: 429.

**Type species:** *Servaisia erythrocera* Robineau-Desvoidy, 1863 (misspelled name of *Sarcophaga erythrura* Meigen, 1826):

Small or medium-sized flies (body length 5-11 mm). Frons at narrowest part in ♂ not more than 0.22 and in ♀ 0.33 head width. Frontal vitta widening forwards in ♂, parallel-sided in ♀, broader than parafrontal. Palpus elongate, narrow in ♂, widening apically in ♀. 3rd antennomere 1.2-2.5 times as long as 2nd, arista long pubescent, widening in basal 0.2-0.4. One row of postor, vte fine or absent in ♂, strong and long in ♀; fr long and strong, crossed. Parafrontal and upper part of parafacial with numerous black hairs, lower part of parafacial with 1-3 vertical rows of medium-length bristles. Gena and upper part of occiput with black setae, under part of occiput with dense, bright hairs. Postsutural dc 3, exceptionally 4. Propleuron bare or with a few small setae. Scutellum with long and strong bas and subap, ap in ♂ crossed, in ♀ very fine or absent, lat and praebas fine, hair-like, discal medium-length, 1-2 paired; $t_2$ with 2-3 ad. Ctenidium on mid femora in ♂ distinct, mid femoral organ in ♀ absent. Costal spine medium length, in ♀ often reduced or short, $R_5$ open, $r_1$ bare, $r_{4+5}$ with several basal black setae. Abdominal tergite III usually with several black basal setae and usually with pair of mediomarginals. Genitalia in ♂ large. Abdominal segment VII+VIII short, usually with well developed marginals. Cercus with short setae apically but without spines, surstyli elongate with numerous setae. Pregonite and postgonite pointed. Basiphallus elongate, limen of complicated structure, ventral lobes membraneous, apical plate bilobate apically. Ovipositor well sclerotized, elongate; abdominal tergite VII completely reduced.

Ground coloration dark grey, antenna and palpus black. Thorax grey dusted, longitudinal stripes on mesonotum lustrous black. Legs black, wings hyaline. Abdomen with dark chequered pattern, spots and stripes poorly developed. Genitalia in both sexes lustrous red to black.

About 55 species are distributed in the Holarctic and Neotropical regions, and 21 species are known from the Palaeartic region.

**References:** Rohdendorf 1937: Fauna SSSR 19, 1: 75-87; Roback 1954: Illin. biol. monogr. 23: 86-87; Verves 1985: Fliegen palaearkt. Reg. 11, 64 h, Lf. 330: 422-440 (species revision); 1993: ibid., Lf. 331: 441-448.

**Key to the species of *Servaisia***

1. ♂. Ventral margin of cercus almost straight. Ventral lobes with hind arm pointed. ♀. Dorsal concavity of ovipositor expanding up to apex ................................................ *S. (S.) erythrura* (Mg.)
– ♂ Ventral margin of cercus distinctly curved. Ventral lobe without hind arm. ♀. Dorsal concavity of ovipositor not expanding up to apex ................................................................ *S. (S.) rossica* (Vill.)

## *Servaisia erythrura* (Meigen, 1826)

Syst. Beschr. 5: 30.

**Description**

♂. Frons at narrowest part 0.09-0.18, at vertex 0.17-0.23 and at antennal base 0.27-0.34 head width. Frontal vitta widening 1.5-2.3 times forward and at frons middle 2-3 times as wide as parafrontal, 3rd antennomere 1.4-2.0 times as long as 2nd. Parafacial at level of antennal base 0.2-0.24 and gena 0.22-0.3 eye height. fr 8-12, parafacial with 1-2 rows of vertical bristles. Head dark, densely silvery grey pollinose. ac 2-4+1-2, dc 3+3, ia 0-1+2-3, h 3-5, ph 2-3, sa 3, npl 2 long + 2-3 short, spl 2+1 or 1+1+1, propleuron bare. Ratio between 3rd and 5 costal sections 1 : 0.8-1.1. Thorax dark grey dusted, longitudinal stripes on mesonotum poorly developed. Cercus broadening apically, ventral margin almost straight (Fig. 150). Basiphallus broader than distiphallus. Ventral lobe with hind arm pointed, apical plate medium-length, slightly curved ventrally. Genitalia lustrous red to black (Plate XII).

♀. Frons 0.25-0.3 head width. Frontal vitta 1.5-2.4 times as broad as one parafrontal. Ovipositor (Fig. 139) curved under abdomen. Dorsal concavity expanding to apex. Ovipositor lustrous red to black.

**Distribution:** Widely distributed in the Palaearctic region.

**Ecology:** A species associaled with mesophytic habitats with bushes etc. Larvae are parasitoids of Acridoidea: *Chorthippus apricarius* L., *Ch. biguttulus* L., *Ch. longicornis* Latr. (Olsufjev 1929), *Calliptamus italicus* L. (Portschinskij 1894), *Chrysochraon dispar* Cerm., *Dociostaurus maroccanus* Thnb. (Séguy 1941a), *Locusta migratoria* L. /Portschinskij 1894), *Omocestus viridulus* L. (Olsufjev 1929), *Pezotettix* sp. (Portschinskij 1894).

## *Servaisia rossica* (Villeneuve, 1912)

Annl. hist.-nat. Mus. natn. hung. 10: 611 *(Blaesoxipha)*.

**Description**

♂. Frons at narrowest part 0.15-0.20, at vertex 0.2-0.26 and at antennal base 0.28-0.35 head width. Frontal vitta 1.5-2.3 times wider forward and 1.5-2.5 times as wide as parafrontal. 3rd antennomere 1.5-1.8 times as long as 2nd. Parafacial at antennal base 0.19-0.25 and gena 0.24-0.32 eye height. fr 9-13, one vertical row of parafacials. Head dark grey or silvery grey pollinose, 2nd antennomere often reddish. ac 3-4+1-2, dc 3+3, ia 0-1+2-3, h 3-5, ph 2-3, sa 3, npl 2 long + 2 short, spl 2+1 or 1+1+1, propleuron bare. Ratio between 3rd and 5th costal sections 1 : 0.8-1.3. Mediomarginals on abdominal tergite III often fine or absent. Ventral margin of cercus distinctly curved (Fig. 147). Basiphallus as broad as distiphallus, hind arm of ventral lobe not pointed, apical plate elongate, apex narrow and strongly curved ventrally. Thorax black, grey pollinose, with mesonotum showing black longitudinal stripes. Abdominal pattern yellowish grey and dark chequered, medial longitudinal stripe of tergites III-V well developed. Genitalia orange red, occasionally fuscous, lustrous.

♀. Frons 0.27-0.33 head width, 1.2-1.5 × times as long as one parafacial. Ovipositor strongly curved ventrally (Fig. 140), dorsal concavity not expanding up to apex. Tergite VI and ovipositor lustrous orange.

Body length 6-10 mm.

**Distribution:** Widely distributed in the Palaearctic region. Flies frequent mesophytic vegetation and sandy areas. Ecology: Larvae are parasitoids of Acridoidea: *Chorthippus biguttulus* L. (Léonide & Léonide 1971), *Ch. brunneus* Thnb. (Verves 1974), *Ch. mollis* Charp. (Léonide & Léonide 1971), *Eirenephilus longipennis* Sh. (Artamonov 1985), *Euchorthippus declivus* Bris., *E. pulvinatus* F.-W. (Léonide & Léonide 1971), *Gomphocerus sibiricus* L. (Rohdendorf 1937), *Dociostaurus maroccanus* Tbnb. (Léonide 1983), *Locusta migratoria* L. (Predtechenskij 1930), *Omocestus haemorrhoidalis* Charp., *Stauroderus scalaris* F.-W. (Verves 1987a). The female injects the ovipositor into the intersegmental membrane of the host and deposits larvae (Léonide 1967).

## Genus *Tephromyia* Brauer & Bergenstamm, 1891

Denkschr. Akad. Wiss. Wien 58: 366.
**Type species:** *Sarcophaga grisea* Meigen, 1826.

Bright grey medium-sized flies. 3rd antennomere 1.5-2 times as long as 2nd. Arista long pubescent, inflated in basal 0.2-0.3. Parafacial moderately wide, gena very high, 0.3-0.4 eye height. One row of postor, ocellars long and strong, proclinate, vte in ♂ fine, in ♀ strong, fr numerous, long and crossed. Parafrontal with short black hairs, parafacial with one row of medium-length bristles. Gena and upper part of occiput black haired, lower part with long bright setae. Palpus inflated at apex, especially in ♀. ac 1-3+1-3, dc 3+3, ia 0-1+2-3, spl 2+1, propleuron bare, $t_2$ with 2-3 ad, ctenidium at ♂ $t_2$ distinct, midfemoral organ in ♀ absent. Costal spine in ♂ short, in ♀ long, $R_5$ open, $r_1$ bare, $r_{4+5}$ with a few short basal setae. ♂ genitalia medium-sized. Cercus very broad, apex with appendix narrow and pointed, apical part with numerous spines. Paraphallus elongate and occupying dorsal part of distiphallus completely; limen large, ventral lobe elongate and well sclerotized. Base of ovipositor broad corresponding to width of abdominal tergite VI, moderately long, apical part distinctly narrowed.
One palaearctic species is known.

### *Tephromyia grisea* (Meigen, 1826)

Syst. Beschr. 5: 18 *(Sarcophaga)*.

#### Description

♂. Frons at narrowest part 0.24-0.3, at vertex 0.3-0.34 and at antennal base 0.32-0.41 head width. Frontal vitta 1.6-2.5 times wider forwards, frons at middle 1.5-2 times as broad as parafrontal. Parafacial at antennal base 0.16-0.22 eye height. fr 9-11, h 3-4, sa 3, npl 2 long +2-3 short. Scutellum with long and strong subap and bas, very fine lat and 1-2 pairs of discals, ap absent. Ratio between 3rd and 5th costal sections 1: 0.7-1. Abdominal tergite III with pair of strong mediomarginals. Segment VII+VIII with row of fine marginals. Genitalia see Figs 145, 160.

Body dark grey, densely pale grey pollinose. Head silvery grey or yellowish grey dusted, frontal vitta black or brownish, almost undusted, antenna and palpus black. 2nd antennomere distally reddish brown. Thorax yellowish grey pollinose, with distinct black mesonotal stripe. Legs black, grey dusted, wings hyaline with greyish base. Abdomen densely grey or yellowish grey dusted, nearly patternless, tergites I+II-IV with poor indication of medial longitudinal stripe. Segments VII+VIII brownish black and densely grey pollinose, epandrium bright red to yellowish orange, dull, pale dusted, cercus and aedegus reddish brown to pale brown lustrous (Fig. 145).

♀. Frons 0.28-0.34 of eye width. Frontal vitta 1.3-1.7 times as broad as parafrontal. Ovipositor see Fig. 146. Thorax bright densely grey, yellowish grey or golden grey dusted, longitudinal stripes poorly developed. Abdomen grey or yellowish grey pollinose, patternless. Palpus brown to yellowish brown. 2nd antennomere completely yellowish red, 3rd antennomere with only basal part brown, and lustrous (Fig. 146).

Body length 5-10 mm.

**Distribution:** Widely distributed in central and southern Europe, Transcaucasus, northern Kazakhstan, southern Siberia, Far East, northern China and Mongolia.

**Ecology:** The flies live in mesophytic habitats and grassland with bushes and are attracted by (human) faeces. Larvae are parasitoids of acridoid grasshoppers, mainly *Dociostaurus maroccanus* Thnb. (Paoli 1919, 1939) and *Oedipoda caerulescens* (Verves 1985).

### Tribe Raviniini Rohdendorf, 1937

Fauna SSSR 19, 1: 49.

Frons in ♂ narrow, without proclinate or, in ♀ broader, with 2 pairs of strong proclinate or. fr strong, crossed, often not diverging forward. Frons and oral margin slightly protruding in lateral view. 3rd antennomere 1.2-3.5 times as long as 2nd, arista long pubescent, basal 0.2-0.4 inflated. Parafontal haired, parafacial with rows of bristles. Angular vibrissae very long and strong, underpart of facial ridge often shortly bristled. Propleuron bare or occasionally with few setae. Postsutural ac 1 or absent, postsutural dc 3-4 pairs, strong. Ctenidium at ♂ $f_2$ distinct, mid-femoral organ in ♀ absent. $r_1$ bare or (in *Chaetoravinia*) haired, $r_{4+5}$ basally haired. $R_5$ open, less often closed. Segment VII+VIII in ♂ shorter than broad (high), shorter than very large epandrium. Cerci broadly separated in posterior apical part, in lateral view straight or slightly curved ventrally, surstylus short. Basiphallus and distiphallus complete, small epiphallus present. Internal parts of distiphallus form a petiolate appendix or hillae, membranal lobes well developed, apical plate poorly developed or absent. First instar larva without mandible, metacephalon with preoral furrow.

The tribe comprises 2 subtribes, 8 genera and more than 130 species widely distributed in the Americas and Oceania. Only one palaearctic species is known. Adult flies are polytopic, several species are culturophile to synanthropic. Larvae are coprophagous or predators of other coprophagous and coprophilous insects, and possibly facultative parasites or predators in tissues of both invertebrates and vertebrates. The nearctic species *Cistudinomyia cistudinis* Tns. is known to produce obligatory cutaneous myiasis in marine turtles.

### Genus *Ravinia* Robineau-Desvoïdy, 1863

Hist. nat. Dipt. Paris 2: 434.
**Type species:** *Sarcophaga haematodes* Meigen, 1826 (synonym of *Musca pernix* Harris, 1780).

Small (body length 4-9 mm), grey flies with reddish or orange postabdomen. 3rd antennomere 1.5-2.5 times as long as 2nd. Lower frontal bristles parallel. $r_1$ bare. Abdominal tergite III without mediomarginals. Epandrium quadrate, not elongate. Epiphallus present but short, hillae rather protruding, membranal lobes elongate and narrow, ventral lobes very short, triangulate, well sclerotized, apical plate absent. 17 species occur in the Nearctic and Neotropical regions and one palaearctic species is known. Larvae are coprophagous.

### *Ravinia pernix* (Harris, 1780)

Exp. Engl. Ins. 84 *(Musca).*

*Musca striata* Fabricius, 1794, Ent. Syst. 4: 315 (preocc. by Gmelin 1790).
*Musca haemorrhoidalis* Fallén, 1817. Kongl. svenska Vetensk. Akad. Handl. 3 (1816): 23 (preocc. by Villers 1789).
*Sarcophaga haematodes* Meigen, 1826. Syst Beschr. 3: 29.

#### Description

♂. Frons in narrowest part 0.17-0.25, at vertex 0.27-0.31 and at antennal base 0.32-0.40 head width. Frontal vitta 1.3-1.7 times wider forwards, 3-5 times as broad as parafrontal. 3rd antenomere 0.24 and gena 0.33-0.40 eye height. One row of postor, ac long and strong, proclinate, vte poorly developed; fr 5-9, 1-2 rows of very short parafacial setae. Lower part of occiput long and yellowish white haired. Parafrontal and facial densely yellowish silver pollinose; gena and occiput grey or yellowish grey dusted, frontal vitta brown to black, very fine dusted, antenna and palpus black, distal part of 2nd

antennomere reddish yellow to bright brownish. ac 2-3+1, praescutellar pair very strong, dc 3+3, ia 0-1+2-3, h 3-4 , ph 2-3, sa 3, npl 2 long +1-3 short, spl 2+2 or 1+1+1. Propleuron bare. Scutellum with long and strong bas and subap, short lat and praebas, and with one pair of discals, ap absent. Ratio between 3rd and 5th costal sections 1 : 0.9-1.1. Thorax yellowish grey dusted, black longitudinal mesonotal stripes well developed. Legs black, wing hyaline. Genitalia see (Figs 149, 152). Abdominal segment VII+VIII grey pollinose, reddish brown, hind margin orange, epandrium orange to red, lustrous. Abdomen slightly pale grey dusted with chequered pattern.

♀. Frons 0.3-0.38 of head width. Frontal vitta 2-3 times width of one parafrontal. fr 4-7, not crossed, vte long and strong. Abdominal tergite Vi complete, with strong marginals. Tergite VII consisting of large paired and well sclerotized, bare lateral plates, tergites VIII-X are reduced. Sternite X large, triangulate, poorly sclerotized and haired. Sternites VII and VIII bare, short and broad. Sternite VI elongate, apical part right-angled with short bristles; tergite VI reddish brown, grey dusted, ovipositor orange to red, lustrous.

Body length 4-9.5 mm.

**Distribution:** Widely distributed in the Palaearctic and in the northern part of the Oriental regions. The species is rather euryoecious, but thermophilic so that the flies are active at noon hours. They seek sunlit grassland, forest steppe or open steppe on dry substrates (serpentine, granite, chalk, loess etc.) or on sand.

**Ecology:** The flies feed at flowers, animal excrement and carcasses etc. Larvae are schizophagous developing in faeces, dung and carrion (Portschinskij 1881, Séguy 1941a, Sychevskaya 1960, 1970 etc.). It is believed that larvae might live at least partly as predators of ether coprophilous larvae, especially maggots (Pickens 1981) and also as facultative predators or parasitoids of lepidopterous larvae and pupae: *Loxostege sticticalis* L., *Lymantria dispar* L., *L. monacha* L., in beetles such as *Oryctes nasicornis* L.: acridoid grasshoppers such as *Chrysochraon dispar* Germ, *Dociostaurus maroccanus* Thnb., *Podisma alpina* Kohl., and may also produce myiasis in man (e.g. Baer 1921, James 1947, Nakonechnyj 1973a,b, Séguy 1941a, Verves 1974 etc.). This species shows a culturophily accompanying especially wild rabbit habitats and is known to act as a passive vector of dysenterial bacteria, protozoan cysts (*Chilomastix mesnili, Lamblia intenstinalis*), oncosphaerae of tapeworms, e.g. *Taeniarrhynchus saginatus* (Sychevskaya, Skopina & Petrova 1959, Nadzhafarov 1967, Trofimov & Engelhardt 1965 etc.).

## Tribe Johnsoniini Rohdendorf, 1967

Proc. Paleont. Inst. 116: 59.

♂. Frons narrow with or occasionally without proclinate orbitals. Parafacial and gena moderately broad, with bristles or hairs. 3rd antennomere 2-4 times longer than 2nd, arista with long or short hairs, occasionally (subtribe Neophytoina) almost bare. fr strong, crossed, divergent frontally. Angular vibrissae strong and long, prementum mid-long. Palpus long with apex widened. Postsutural dc usually 3, less fequently 2-4-5 pairs. propleuron both bare or haired. Ctenidium of ♂ mid femora well developed. $R_5$ open, occasionally closed. Cercus not curved dorsally, membranal and ventral processes well developed, strongly sclerotized. Apical plate heavily sclerotized, without lateral arms. Stylus usually long (Fig. 211). ♀ with abdominal tergite VI complete, occasionally bilobate. Tergite VII well developed, consisting of paired haired or bare lateral plates. Abdominal pattern chequered, in some Neotropical species with blue or metallic lustre. First instar larva without clypeal arch.

The tribe comprises 6 subtribes, 34 genera and more than 150 species generally distributed in the Neotropics; about 20 species are nearctic, one *(Fergusonimyia)* occurs in Australia, and one monobasic genus *(Sarcotachinella)* is holarctic. Larvae are parasites of insects, earthworms, snails, amphibians and reptiles, and are occasionally necrophagous (in bird nests on dead birds).

### Subtribe Sarcotachinellina Verves, 1988

Ecol. and tax. of Ukrainian Insects 105 (Kiev, in Russian).

Grey, medium-sized flies. ♂ frons without proclinate orbitals. Arista long plumose, parafacial with row of bristles, head profile angular. 3 pairs of postsutural dc, ctenidium poorly developed, propleuron bare. Styli claw-like, paraphallus well sclerotized, very high. ♀ with abdominal tergite VI consisting of paired lateral plates, tergite VII complete, membranous centrally, laterally well sclerotized tergites VII-X absent. Abdomen grey pollinose with chequered pattern. The tribe is represented by a single genus.

### Genus *Sarcotachinella* Townsend, 1892

Trans. Amer. Ent. Soc. 19: 110.
**Type species:** *Sarcotachinella intermedia* Townsend, 1892 (a synonym of *Sarcophaga sinuata* Meigen, 1826).

3rd antennomere 1.5-2 times longer than 2nd. Facial at level of antennal base broader than frontal. Parafacial and gena comparatively narrow, 0.3 eye-height. 1-2 rows of postor, vte in ♂ well developed, ocellar bristles strong, ac 0+1, spl 1+1+1 or 2-3+1. Mid femora anterodistal with distinct golden hairs at 0.3-0.4 of length. Midfemora in ♀s with very small femoral organ in middle. $t_2$ with 2-3 ad. $R_5$ open, $r_1$ bare, costal spine strong, m-cu strongly sigmoid. ♂ genitalia medium-sized, segments VII+VIII quadrate laterally. Epandrium shorter than long (high). Cerci apically with short dorsal spines, surstylus very short. Basiphallus of same length as distiphallus or shorter. Membranal process elongate, well sclerotized, three-lobed. ♀ with abdominal sternites VI and VII long and narrow. Sternite VI with strong marginals, sternite VII apically setose, sternite VIII very small, membranous and bare, sternite X medium-sized, membranous and setose. Body dark, genitalia black, occasionally reddish in females. One species.

**References:** Pape 1987: Fauna ent. scand. 19: 153-155.

### *Sarcotachinella sinuata* (Meigen, 1826)

Syst. Beschr. 5: 22 *(Sarcophaga).*

*Sarcotachinella intermedia* Townsend 1892. Trans. Am. Ent. Soc. 19: 111.

#### Description

♂. Frons at narrowest part 0.22-0.27, at vertex 0.25-0.29 and at antennal base 0.39-0.46 head width. Frontal vitta parallel-sided, at frons middle 1.2-2 times as wide as one parafrontal. Parafacial at antennal base 0.29-0.34, gena 0.3-0.35 eye height. fr 7-11, very strong and long, parafacial with short black setae, oral bristles 10-15, fine and hairy, gena and upper part of occiput black setose, lower part of occiput with numerous long brownish yellow to brownish white hairs. Parafrontal and facial yellowish grey pollinose, gena and occiput black, slightly dark grey dusted, frontal vitta brownish black, almost without pollinosity, antenna and palpus black. ia 1+2, h 3, ph 1, sa 3, npl 2 long and 2-3 short, Scutellum with long subap and bas, very fine lat, short and fine ap and one pair d. $f_2$ with complete rows of av and pv, $t_3$ with few long hairy pv; $r_{4+5}$ with a few basal setae. Ratio between 3rd and 5th costal sections 1:1 or 1-1.2. Thorax yellowish grey pollinose, pleura paler, longitudinal mesonotal stripes broad, lustrous black. Legs black, hyaline, base slight yellowish grey, basicosta yellow, epaulet brown to blackish. (Plate XII, Fig. 211).

Abdominal tergite I+II without marginals, tergite III with one pair of strong mediomarginals; hairs on sternites II and III long, short on sternite IV. Each arm of sternite V with strong inside marginals and with long apical hairs. Genitalia see Fig. 211.

♀. Frons 0.32-0.35 of head width. Middle femoral organ small, elongate.

Body length 4-9.5 mm.

**Distribution:** Widely distributed in the mild zone of the Holarctic region. Flies are commonly found in hygrophytic plant associations near rivers and swamps or on sea shores and are attracted to feces and dead animals (Gregor & Povolný 1959, Mihályi & Aradi 1971) and flowers of Asteraceae, Apiaceae, Euphorbiaceae etc. Larvae are parasitoids of grasshoppers (in North America e.g. *Camnula pellucida* Scud., *Melanoplus bivittatus* Say, *M. differentialis* Thomas, *M. sanguinipes* F.), in Spain *Dociostaurus maroccanus* Thnb. (Aldrich 1916, Smith 1958, Rees 1973); females attack flying locusts for larviposition (Aldrich 1916); in Finland bred from the noctuid caterpillar *Nonagria typhae* Thng. (Pape 1987). Near Ussuriysk bred from a dead frog and reared on animal liver (Artamonov 1983). Maggots are common in nests of coastal birds living in dead young birds (Schleswig-Holstein – own observation).

## Tribe Sarcophagini Macquart, 1835

Hist. Nat. Ins. Paris, Dipt. 2: 1-703.

Frons profile protruding, ♂ without proclinate orbital bristles, 3rd antennomere 2-5 times longer than 2nd, arista distinctly and long pubescent, basally inflated at 0.2-0.5. Frontal bristles long and strong, crossed, frontally divergent. Parafacial and gena moderately wide, with hairs or bristles, palpus long with widened apex. Oral margin profile protruding, in rare instances short *(Pandelleana)*. Propleuron bare or haired, ♀ femoral organ usually well developed, ctenidium in ♂ mid femora both well developed or absent. Claws in both sexes elongate, slightly curved. $R_5$ usually open, occasionally closed or petiolate *(Artamonoviella, Notoecus)* (Plate XII). Distiphallus rather differentiated, epiphallus usually reduced, only in North american subtribe Metoposarcophagina elongate. Apical plate and membranal lobes well developed, ventral protuberances usually well developed, in rare instances fused with paraphallus or partly reduced. Styli and medial process of interior distiphallus well developed, occasionally partly reduced. Paraphallus in subtribe Helicophagellina with pair of acute and pointed laterodorsal processes ("auricula"). Harpes developed only in some taxa (e.g. *Thyrsocnema*) (Plate V). Ovipositor. with tergite VI well developed, complete or bilobate, tergites VII-X membranous, usually partly or completely reduced. Spermathecae elongate, apically widened.

The tribe comprises 15 subtribes and more than 750 species of worldwide distribution including 42 palaearctic genera and more than 300 species. The tribe is ecologically rather adaptable. Flies occur in various habitats, feeding at flowers, excrement and animal carcasses or decaying organic substrates, lavae are coprophagous and necrophagous, parasitoid, several taxa tending towards various degrees of synanthropy including eusynanthropic species. Larvae are both facultative and obligatory parasitoids and predators on both invertebrates (earthworms, snails, spiders, insects) and vertebrates, causing myiases.

**References:** Rohdendorf 1965: Ent. Obozr. 44: 676-695; Verves 1989: Mem. Inst. Oswaldo Cruz 84: 538-543.

### Key to subtribes and genera of Sarcophagini

1. Membranal process membranous with distinct borders, or unpaired digitate, spinose or protruding ........ 2.
– Membranal process strongly protruding and usually well sclerotized; if membranous, then with complex structures ........ 4.

2. Laterodorsal claw-like processes of paraphallus ("auricula") well developed. Membranal process short, border sharp, occasionally with distal protuberance; apical plate without lateral arms, membranous or delicate spinose; ventral process absent, ♀ with abdominal tergite VI bilobate, next (caudal) tergites absent (Helicophagellina) ........ *Helicophagella* End.
– Auricula absent, membranal process straight awl-shaped; apical plate often with lateral arms, ventral processes well developed rostrum-formed or lobate, ♀ with abdominal tergite VI usually complete, membranous remainders of tergite VII and VIII usually present (Heteronychiina) ........ 3.

3. Apical plate well sclerotized with elongate lateral arms .......................................... *Discachaeta* End.
– Apical plate membranous, occasionally sclerotized, lateral arms absent, if present, then usually shorter or apical plate spoon-shaped ........................................................................ *Heteronychia* B. B.

4. Apical plate membranous, without lateral arms. Styli widened, apex usually funnel-like. Ventral process bristle-like, membranal process widened, well sclerotized, situated on paraphallus apex (Sarcophagina) ........................................................................................................... *Sarcophaga* Mg.
– Apical plate more or less sclerotized, if membranous then with lateral arms elongate. Ventral and membranal process of different form ........................................................................................ 5.

5. 3-4 pairs of postsutural dorsocentrals of rather same size (Phallanthina) ....................................... 6.
– 4-7 pairs of postsutural dc, fore pairs shorter than hind pairs ....................................................... 12.

6. Frons profile strongly protruding, parafacial very broad, densely haired, without long bristles; oral margin profile not protruding. Apical plate elongate, bilobate, without lateral arms, medial process very long and broad, profile prominent, ventral process absent. Genital segments usually red .... ................................................................................................................................ *Pandelleana* Rohd.
– Frons profile slightly protruding, parafacial medium broad or narrow, with bristles; oral margin profile protruding. Genitalia black ................................................................................................ 7.

7. Stylus broad with short preapical spine. Apical plate shortened, without lateral arms; 3-4 postsutural dc ......................................................................................................... *Arachnidomyia* Towns.
– Stylus narrow and long, lower surface serrate. 3 postsutural dc ..................................................... 8.

8. $r_1$ with basal setae .......................................................................................................................... 9.
– $r_1$ bare .............................................................................................................................................. 10.

9. Ventral process fusing with paraphallus; paraphallus broadened surrounding distiphallus both dorsally and laterally. Membranal process unpaired, elongate, clavate; pregonite centrally broadened ............................................................................................................. *Krameromyia* Verves
– Ventral processes well separated from paraphallus which is narrower and surrounds only lateral parts of distiphallus. Pregonites narrow ......................................................................... *Ascelotella* End.

10. Apical plate with elongate bristle-like dorsolateral arms. 2 pairs of membranal processes, their proximal parts with numerous spines. Ventral processes and harpes narrow and elongate .......... ................................................................................................................................ *Thyrsocnema* End.
– Apical plate without lateral arms ....................................................................................................... 11.

11. Ventral process distinct and separated from paraphallus. Apical plate with apex pointed. Membranal process short and directed ventrally ...................................................................... *Pierretia* R.-D.
– Ventral process indistinct, fused with paraphallus. Apical plate profile broadened, not pointed apically. Membranal process elongate, parallel with longitudinal distiphallus axis ...................... ............................................................................................................................... *Bellieriomima* Rohd.

12. Styli broadened, complex, often with spines or processes (Boettcheriscina) .................................. 13.
– Styli long and narrow, occasionally shortened or covered with membranous "envelope" (Parasarcophagina) ..................................................................................................................................... 14.

13. ♂ with abdominal sternite V cone-shaped ventral process. Stylus without spines. Propeluron bare ................................................................................................................................... *Rosellea* Rohd.
– ♂ with abdominal sternite V without process, stylus spine-like. Propleuron haired ........................ ................................................................................................................................... *Kramerea* Rohd.

14. Stylus with membranous "envelope"; lateral arms of apical plate well developed .......................... .................................................................................................................................... *Liopygia* End.
– Stylus without membranous "envelope"; lateral arms of apical plate present or absent ............ 15.

15. Cercus with a distinct transverse fold (keel) near middle of dorsal ledge; surstylus elongate pointed. Abdomen with longitudinal medial black tergal stripe ..................... *Stackelbergeola* Rohd.
– Cercus without distinct transverse fold (keel) dorsally; surstylus short and rounded. Abdomen with usual chequered pattern ........................................................................................................ 16.

16. Two pairs of hook-shaped membranal lobes; medial process broad and elongate, distinct; apical plate bilobate, without lateral arms hook-shaped .................................................... *Robineauella* End.
– One pair of membranal processes; if two, then not spine-shaped; medial process poorly developed, indistinct ........................................................................................................................................ 17.

17. Praescutellar ac absent; membranal lobes well sclerotized, hook-shaped, protruding ventrally; paraphallus distinctly elongate occupying entire dorsal surface of distiphallus; apical plate displaced ventrally; apical part of cercus distinctly narrowing with a longitudinal ledge (keel) ........ ........................................................................................................................................ *Bercaea* R.-D.
– Praescutellar ac usually present; membranal lobes different; paraphallus shortenend, apical plate not displaced ventrally ........................................................................................................ 18.

18. Apical plate with more or less elongate lateral arms ........................................... *Liosarcophaga* End.
– Apical plate without lateral arms ......................................................... *Parasarcophaga* Johns. & Tiegs

## Subtribe Helicophagellina

Lopes, Kano, Shinonaga & Kurahashi 1977, Cat. Dipt. Orient. Reg. (Honolulu) 576; Verves 1989. Mem Inst. Oswaldo Cruz 84: 538.

Bellieriina Enderlein, 1928. Arch. klass. phylog. Ins. 1: 9 (Bellieriini – based on *Bellieria* sensu Enderlein, 1928, nec Robineau-Desvoidy, 1863).

This subtribe appears to be rather ancient (within Sarcophagini) and it comprises the single genus *Helicophagella*.

♂ frons narrower than eye, in ♀ same width. 3rd antennomere 1.5-2 times as long as 2nd. 3-(4) pairs of strong postsutural dc-bristles, $r_1$ bare, $R_5$ open, in rare instances closed. Ctenidium poorly developed or absent. Propleuron bare. Cercus straight or moderately curved ventrally, apex pointed. ♂ genitalia with segments VII+VIII large and long, epandrium quadrate or elongate. Basiphallus moderately shorter than distiphallus, epiphallus absent. Paraphallus well sclerotized, elongate, with pair of spined dorsal processes ("auricula"). Apical plate short and membranous or spined and without lateral arms. Membranal process ribbon-like and membranous, occasionally with proximal protuberance, ventral process absent; ♀ with abdominal tergite VI bilobate, tergites VII-X absent.

## Genus *Helicophagella* Enderlein, 1928

Arch. klassif. phylogen. Ent. 1: 38.
**Type species:** *Sarcophaga noverca* Rondani, 1860.

*Bellieria* Enderlein, 1928. Arch. klassif. phylogen. Ent. 1: 36.
*Bellieria* Robineau-Desvoidy, 1863 (Rohdendorf 1937, Fauna SSSR 19: 129-151).

Grey flies of medium to big size (5-17 mm), with chequered abdominal pattern. Arista base at 0.3-0.4 of length inflated, long or moderately long haired. 1-3 postorbital rows, ♂ vte indistinct or short, in ♀ well developed. fr strong, crossed, ocellars strong. Gena and upper occiput with black bristles, lower occiput with dense yellowish white or greyish white hairs. Head silvery white or yellowish grey pollinose, frontal vitta black to dark brown, almost without pollinosity. Antenna and palpus black, rarely brownish black. ac usually 0+1, rarely *(H. agnata)* 2-4+1, dc 2+3+3-4, h 3-4, ph 1-2, ia 0-1+2, sa 3, npl 2 long +2-4 short, spl 1-3+1. Scutellum with strong bas and subap, ap fine, crossed, lat very fine, d fine, ap and lat absent in ♀s. Femoral organ in ♀ either present or absent. $t_2$ with 2-4 ad, all f and $t_3$

in ♂ with numerous long ventral hairs. Costal spine distinct, 3rd costal section longer than 5th, relation between 2nd and 3d sections of medial vein 1 : 0.2-0.4, $r_{4+5}$ haired at base. Mesonotal longitudinal stripes well developed; legs black, grey dusted, wings hyaline, base smoked, basicosta and preepaulet yellow, epaulet deep brown to black. Mediomarginals of abdominal tergite III either present or absent. Inside spinose chaeta on paired arms of ♂ sternite V ("brush") well developed. Genitalia black.

The genus is subdivided into 2 subgenera, comprisiting in all 15 species, of which 14 are palaearctic and one *(H. melanura)* occurs in the Holartic and Oriental regions. Larvae of *Helicophagella* s. str. are necrophagous, predacious or pseudoparasitoid on terrestrial snails; the subgenus *Parabellieria* includes coprophagous taxa. *H. maculata, H. macrura* and *H. melanura* are synanthropic visitors of faeces.

**Reference:** Verves 1993: Fliegen palaearkt. Reg. 11 (64 h.), Lf. 331: 464-483.

### Key to subenera and species of *Helicophagella*

1. Apical plate membranous, narrow, without spines *(Parabellieria)*. Abdominal segment VII+VIII medium-sized, not more than 1.5-2 times as long as broad (high), epandrium quadrate, membranal process completely membranous .......... *H. (P.) melanura* (Meig.)
– Apical plate well sclerotized, spinose *(Helicophagella* s. str.) .......... 2.
2. Abdominal tergite III with pair of strong mediomarginals .......... 3.
– Abdominal tergite III without mediomarginals .......... 5.
3. Presutural acrostichals present. Auricula short, not protruding to dorsal margin of distiphallus . .......... *H. agnata* (Rond.).
– Presutural acrostichals absent, auricula protruding towards dorsal margin of distiphallus .......... 4.
4. Cercus short with base rather widened, wedge-shaped. Apical plate with apex widened and directed ventrally .......... *H. rosellei* (Bött.)
– Cercus long, almost parallel-sided, base not widened. Apex of apical plate slightly widened, not directed dorsally .......... *H. crassimargo* (Pand.)
5. Pregonite very short, almost entirely reduced. Auricula small, almost absent .......... *H. noverca* (Rond.)
– Pregonite well developed, auricula big, spine-formed .......... 6.
6. Styli as long as apical plate .......... *H. verstraeteni* (Lehr.)
– Styli longer than apical plate .......... *H. novella* (Bar.)

### Subgenus *Helicophagella* s. str.

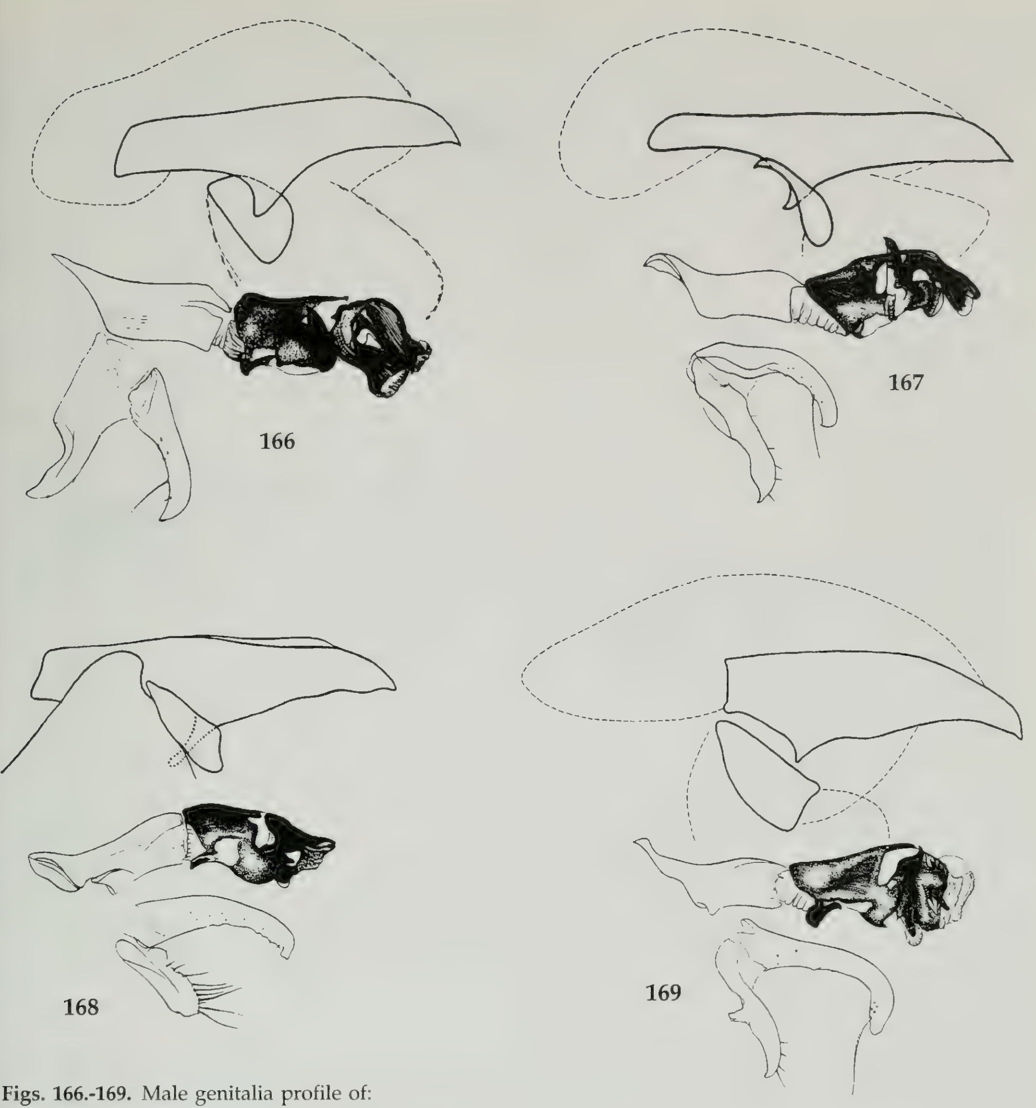
8 palaearctic species, in central Europe 6 species.

#### *Helicophagella* (s. str.) *agnata* (Rondani 1860)

Atti Soc. ital. Sci. nat. 3: 383 *(Sarcophaga)*.

**Description**

♂. Frons at narrowest part 0.13-0.8, at vertex 0.17-1.22 and at antennal base 0.36-0.41 head width. Frontal vitta 1.2-1.5 widening forwards, at frons middle 1.5-2 times as wide as parafrontal, 3rd antennomere 1.4-1.8 times as long as 2nd. Parafacial at antennal base 0.18-0.23 and gena 0.23-0.28 eye heigth. fr 9-13, parafrontal with erect hairs, with 2 rows of medium-length bristles, lower bristles longer exceeding parafacial width. Facial ridge at lower 0.3-0.4 with some short hairs. Head silvery white pollinose. dc 2-4+1. Ctenidium present. $t_3$ with a row of long, fine pv, m-cu arcuate, relation between 3rd and 5th costal sections 1:0.6-0.8. Abdominal tergite III usually with strong mediomarginals, which are occasionally shortened or weak. Genitalia medium-sized, segment VII+VIII with fine



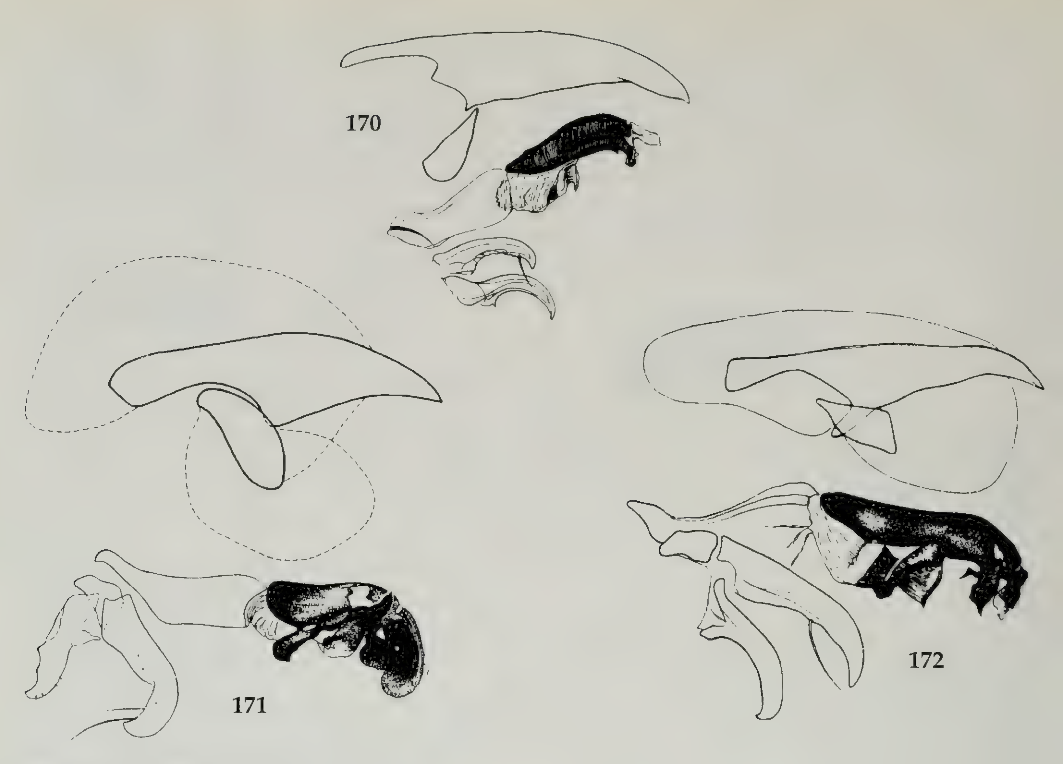

**Figs. 166.-169.** Male genitalia profile of:
**Fig. 166.** *Helicophagella agnata*
**Fig. 167.** *Helicophagella crassimargo*
**Fig. 168.** *Helicophagella noverca*
**Fig. 169.** *Helicophagella novella*

marginals. Cercus narrow, blade-like, gonites medium-length, elongate, strongly protruding ventrally (Fig. 166)

♀. Frons 0.29-0.35 of head width. Femoral organ absent. Interior margin of abdominal tergite VI longer than outside, segment VII present, consisting of two small and bare lateral plates.

Body length 6-11 mm.

**Distribution:** Central and southern Europe, northern Kazakhstan (Kokchetaw). A woodland species accompanying both deciduous and coniferous forests being clearly focused in montane beech woods *(Fagus)* of central Europe. The species is generally rare and local being restricted to undisturbed habitats. Flies feed at flowers on forest margins or in forest interior clearings, being skiophilous. It has been reared from the snail *Helix aspersa* Müll. (Emden 1954).




**Figs. 170.-172.** Male genitalia profile of:
**Fig. 170.** *Helicophagella macrura*
**Fig. 171.** *Helicophagella rosellei*
**Fig. 172.** *Helicophagella melanura*

### *Helicophagella* (s. str.) *crassimargo* (Pandellé, 1896)

Revue Ent. 15: 195 *(Sarcophaga)*.

**Description**

♂. Frons at narrowest part 0.18-0.25, at vertex 0.21-0.27 and at level of antennal base 0.3-0.38 head width. Frontal vitta 1.3-1.6 times wider frontally, at frons middle 2.5-3.5 times wider than one parafrontal. 3rd antennomere 1.2-1.6 longer than 2nd. Parafacial at antennal base 0.17-0.22 and gena 0.18-0.27 eye-height. fr 7-10, parafacial with 1-2 rows of short setae, lower pairs stronger and longer than parafacial width. Facial ridge with small setae at lower 0.3-0.4. Head silvery grey or yellowish grey dusted. Ctenidium absent. m-cu sigmoid, relation between 3rd and 5th costal sections 1: 0.8-1.1. Thorax yellowish grey pollinose. Abdominal sternite II long setose, sternites III and IV with short hairs. Abdominal tergite III with 2-4 strong and long mediomarginals, segment VII+VIII 1.2-1.5 longer than broad, with long marginals. Cercus elongate, narrow, rather parallel-sided. Gonites medium-length, spine-like. Distiphallus short and thick, auricula protruding before dorsal margin of distiphallus, apical plate not protruding ventrally, rounded (Fig. 167). Segment VII+VIII dull, genitalia lustrous black.

♀. Frons 0.32-0.35 of head width. Mid-femoral organ present and situated distally, lateral plates of abdominal tergite VI each with 6-8 marginals, tergite VII complete, membranous, haired.

Body length 4.5-10.5 mm.

**Distribution:** Widely distributed in Europe, western Siberia, Kazakhstan, Kirgizia, Georgia (Gruzia) and Azerbaijan. The species shows a considerable hypsometric potence reaching elevations up to

2.000 m a.s.l., e.g. in the European Carpathian Mountains. It avoids forests preferring open landscape and very dry habitats with poor vegetation including podzol soils and is heliophilic. Flies feed at flowers of Asteraceae, Euphorbiaceae etc and are readily attracted to decaying organic substrates (faeces, excrement, cheese, carcasses). Larvae are essentially copro-necrophagous (Sychevskaya 1965) and have been occasionally reared from snails (*Helicella (Cerbuella) virgata* de Costa) (Keilin 1919).

### *Helicophagella novella* (Baranov, 1929)

Neue Beitr. syst. Insektenk. 4: 150 *(Sarcophaga)*.

*Bellieria cepelaki* Lehrer, 1975. Bull. Annls. Soc. r. ent. Belg. 111: 288.
*Bellieria okaliana* Lehrer, 1975. Bull. Annls. Soc. r. ent. Belg. 111: 288, nomen nudum.
*Bellieria novercoides* sensu Povolný & Slamečková, 1969. Acta ent. bohemoslovaca 66: 55 (not Böttcher 1913).

**Description**

♂. Frons at narrowest part 0.17-0.21, at vertex 0.25-0.27, at antennal base 0.38-0.42 head width. Frontal vitta 1.2-1.5 times wider frontoventrally; frons middle 1.5-2.7 of parafrontal width. 3rd antennomere 1.5-2 longer than 2nd. Parafacial at level of antennal base 0.21-0.26, gena 0.21-0.23 eye height; fr 6-11, one or two rows of mid-long parafacial bristles. Head silvery dusted. Ctenidium poorly developed, $f_3$ without strong av; m-cu vein sigmoid; ratio between 3rd and 5th costal section 1 : 0.5-0.7. Thorax dark grey pollinose. 3rd abdominal tergite without mediomarginals. Abdominal tergites II and III long setose, sternite IV with short hairs. Segment VII+VIII distinctly elongate, twice als long as broad, with fine marginals. Epandrium elongate (like in *Heteronychia*). Cercus long with broad bases, apex narrower and pointed, moderately curved ventrally. Pregonite moderately curved and pointed, shorter than long and arcuate. Membranal process protruding, auricula elongate, apical plate short, projecting ventrally (Fig. 169).

♀ unknown.

Body length 6.5-13 mm.

**Distribution:** This is a montane, mostly calciphilic species, accompanying the Alps, the Carpathians, and the (limestone) formations of the Balkan Peninsula occurring at elevations up to the rocky alpine deserts above the timberline (e.g. High Tatra, Austrian and Bavarian Alps, Vichren in Bulgaria, Biokovo in Dalmatia, Olympos in Greece). On the Adriatic sea coast and in Greece the species accurs during early spring, but occasionally also in late summer on limestone cliffs near sea level (together with the rather common *Heteronychia bezziana*). The closely related *Helicophagella novercoides* (Böttcher 1913) (Dt. ent. Z. 4: 367/*Sarcophaga*/) was erroneously confused (Povolný & Slamecková 1969) and synonymized (Verves 1986) with *H. novella* (Bar.). *H. novercoides* appears to be a purely mediterranean taxon probably not ascending montane elevations. It is closely related to *S. novella* showing, however, a different form of the apical membranous fold of the distiphallus which is differentiated ventrally forming a detached ventral arm (Fig. 244). This situation is complicated by the fact that *H. novella* shows a considerable hypsometrical potence in the Balkan maritime countries. Specimens from alpine zones may reach body length of only 6.5 mm.

The further complication is the existence of a next morphologically distinct form of this complex occurring in the foothills of the Olympos Mountains (Povolný 1995) in Greece. The complex of *Helicophagella novercoides* deserves consequently a specialized study.

### *Helicophagella* (s. str.) *noverca* (Rondani, 1860)

Atti Soc. ital. Sci. nat. 3: 386 *(Sarcophaga)*.

**Description**

♂. Frons at narrowest part 0.17-0.20, at vertex 0.21-0.27 and at antennal base 0.29-0.34 head width. Frontal vitta 1.5-2 times wider frontoventrally, at frons middle as wide as parafrontal. 3rd antennomere 1.3-1.7 times longer than 2nd. Parafacial at level of antennal base 0.16-0.21 and gena 0.22-0.29 eye height. fr 8-11, parafacial with one row of bristles, upper bristles short and fine, lower ones strong and

as long as parafacial width. Facial ridge shortly bristled at lower 0.4-0.5. Head dark, densely yellowish white pollinose. Ctenidium absent. Thorax dark, grey dusted. m-cu sigmoid, curved, relation between 3rd and 5th costal sections 1 : 0.6-0.9. Abdominal sternites II-IV long-haired, tergite III without mediomarginals. Genitalia large, protruding (Fig. 168). Segment VII+VIII 1.5 times broader than long, with very fine marginals, epandrium quadrate. Cercus straight, medium-length, pregonites very short, densely haired, postgonites longer, spine-like. Membranal process very small, strongly sclerotized, protruding. Auricula short. Apical plate profile triangulate, with numerous small spines. Genitalia lustrous black (Plate X, Fig. 168).

♀. Frons 0.3-0.34 head width, 3rd antennomere 1.5-2.2 times longer than 2nd. Mid-femur organ big, reddish, situated apically. Paired lateral plates of abdominal tergite VI with 7-10 long and strong marginals outside and with numerous fine hairs inside. Tergite VII poorly developed, membranous, bare.

Body length 5-14 mm.

**Distribution:** Europe up to southern Norway, absent from the British Isles; Georgia (Gruzia), Azerbaijan.

The species accompanies the western palaearctic forest belt but frequents chiefly the warmer lower elevetions (vegetation tiers), and is rare in true mountain forests. Flies feed at flowers of Asteraceae, Daucaceae, Euphorbiaceae and are readily attracted to decaying flesh and faeces, excrement. Larvae develop in dead snails and are facultative (secondary) parasitoids of *Helix pomatia* (Schmitz 1910, 1917) *H. stauropolitana* (Portschinskij 1887), in the laboratory the maggots have been reared on horse meat (Eberhardt 1955).

### *Helicophagella* (s.str.) *rosellei* (Böttcher, 1912)

Dt. ent. Z. 6: 714 *(Sarcophaga)*.

*Bellieria heathi* Lehrer, 1975. Bull. Annls. Soc. r. ent. Belg. 111: 284 (unnecessary new name for *Sarcophaga rosellei*).

#### Description

♂. Frons at narrowest part 0.19-0.24, at vertex 0.23-0.29, at antennal base 0.38-0.45 head width. Frontal vitta almost parallel-sided, 1.5-2.5 times wider than parafrontal; 3rd antennomere 1.5-2.5 times longer than 2nd. Parafacial at level of antennal base 0.14-0.2, gena 0.26-0.39 eye height; fr 7-11, parafrontal with short black setae, parafacial with 1-2 rows of bristles, only lower pair longer than parafacial width. Facial ridge at lower 0.4-0.5 with numerous black short setae. Head bright grey or yellowish grey pollinose. Ctenidium consisting of numerous slender bristles; vein m-cu almost straight or moderately sigmoid; ratio between 3rd and 5th costal section 1 : 0.8-0.9. Thorax grey dusted, dark. Abdominal sternite II with long hairs, sternites III and IV shortly setose. Abdominal tergite III with strong mediomarginals. Segment VII+VIII 1.2-1.5 times longer that broad, with fine marginals. Epandrium square. Cercus short with broad bases, distinctly narrower distally and pointed, almost straight. Pregonite mid-long, shorter than postgonite, almost straight, apically shortly curved and pointed; postgonite elongate, strongly curved ventrally, apex pointed. Membranal process short, well sclerotized. Auricula mid-long not projecting over dorsal distiphallus ledge; stylus broad, apical plate curved ventrally, its base narrow but apically wider and with numerous spines (Fig. 171).

♀. Frons 0.3-0.35 head width. Frontal vitta 1.2-1.5 wider than parafrontal. Mid-femoral organ well developed, reddish to brown, situated at mid-femur. Lateral plates of abdominal tergite VI with 7-9 long marginals (as long as tergal length) at outside ⅔ and with numerous marginal hairs at inside ⅓. Tergite VII absent.

Body length 5.5-12.5 mm.

### *Helicophagella* (s.str.) *verstraeteni* (Lehrer, 1975)

Bull. Annls. Soc. r. Belg. 111: 281 *(Bellieria).*

**Description**

♂. Frons at narrowest part 0.17-0.2, at vertex 0.22-0.25, at antennal base 0.32-0.37 head width. Frontal vitta parallel-sided, 2 times wider than one parafrontal; 3rd antennomere 2-2.2 times longer than 2nd. Parafaciale at antennal base 0.15-0.2, gena 0.2-0.29 eye height; fr 8-10. Parafrontal with short erect black setae, parafacial bristles short and fine, lower pairs stronger, as long as parafacial width. Facial ridge haired at lower 0.3-0.4. Head yellowsh grey or whitish grey pollinose. Ctenidium absent, $f_3$ without strong av-bristles; vein m-cu strongly sigmoid, ratio between 3rd and 5th costal section 1:0.6-0.8. Abdominal sternites II-IV with long hairs. Tergite III without mediomarginals. Genitalia medium-sized. Segment VII+VIII 1.25 times longer than broad, with very fine marginals. Epandrium square. Gonites and aedeagus very similar to *H. rosellei*, but the distal margin of apical plate not concave.

♀ unknown.

**Distribution:** Natural forests of central Europe, Germany, Austria, Hungary, Romania etc.

**Comments.** The discrimination of *Helicophagella rosellei* (Bött.) and *H. verstraeteni* (Lehr.) is ambiguous and a special attention should be paid to this situation (see also Verves 1993). *H. rosellei* (Bött.) is a transpalaearctic species accompanying its forest belt and is characteristic especially of natural forest stands in montane elevations. Moreover, the genitalia figures 480 *(H. novella)* and 486 *(H. novercoides)* on pp. 468 and 471 (Verves 1993) are confused belonging correctly to *H. novercoides* (Fig. 480) and *H. novella* (Fig. 486) respectively.

### Subgenus *Parabellieria* Verves, 1987

Ent. Obozr. 66 (3): 664.
**Type species:** *Sarcophaga melanura* Meigen, 1826.

The subgenus comprises 7 species, only one of which *(H. melanura)* occurs in central Europe.

### *Helicophagella (Parabellieria) melanura* (Meigen, 1826)

Syst. Beschr. 5: 23 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.26-0.31, at vertex 0.28-0.33 and at antennal base 0.36-0.45 head width. Frontal vitta slightly widening forewards, 1.5-2 times as wide as parafrontal. 3rd antennomere 1.4-1.9 times as long as 2nd. Parafacial at antennal base 0.26-0.32 and gena 0.33-0.43 eye height. fr 7-11, parafrontal short black setose, one or two rows of short and fine parafacial setae present, facial ridge with 5-10 short bristles at lower 0.3-0.4. Head yellowish grey or golden grey dusted. Ctenidium present consisting of medium-length bristles, m-cu strongly sigmoid, ratio between 3rd and 5th costal sections 1:0.5-0.8. Thorax silvery grey pollinose. Abdominal sternite II long haired, sternites III and IV with short setae. Tergite III without mediomarginals. Genitalia medium-size (Fig. 172). Abdominal segments VII+VIII 1.5 times longer than broad, marginals present, epandrium square, cercus medium-length, not very wide, Praegonite and postgonite claw-shaped, postgonite moderately longer than praegonite. Paraphalus long and comparatively narrow, apex curved. Apical plate almost straight. Membranal process band-shaped, apical point small (Fig. 172).

♀. Frons 0.35-0.40 of head width. Mid femoral organ absent. Each lateral plate of abdominal tergite VI 2 times wider than long, with 4-8 long lateromarginals. Tergite VII reduced.

Body length 5-14 mm.

**Distribution:** Holarctic, but widely distributed also in northern parts of the Oriental region and reaching the Arctic Circle. Hemisynanthropic species, culturophile preferring mesophytic phytecoenoses with shrubs. Flies feed at flowers, faeces, decaying substrates etc. and are responsible for

transfer of bacterial disease and eggs of helminths (Akakhwedyanz & Zakharova 1961, Greenberg et al. 1971 etc.). Larvae mostly coprophagous, less frequently necrophagous (Rohdendorf 1937, Séguy 1941, James 1947, Sychevskaya 1960, etc.), found also in nests of *Chelidon rustica* (Hicks 1959), bred from larvae of *Oryctes nasicornis* L. (Baer 1921) the scarabeid beetle, the mole cricket *Chorthippus brunneus* Thnb. (Draber-Mońko 1973), snails – *Arion hortensis* Fer. and *Helix aspersa* Müll. (Baer 1921, Séguy, 1941a), producing myiasis (usually intestinal) in birds, mammals and man (James 1947, Emden 1954 etc.).

Hymenopterous pupal parasites are *Alysia manducator* Pz., *Aphaereta minuta* Nees (Vinogradova & Zinovyeva 1972), *Brachymeria minuta* L., *Eucolia trichopsila* Hartig, *Figites scutellaris* Rossi (Belizin 1963, Sychevskaya 1964).

## Subtribe Heteronychiina

Rohdendorf 1965, Ent. Obozr. 44: 693.
Verves 1989, Zool. J. 68: 93-95.

This purely palaearctic subtribe comprises 4 genera and more than 100 species, Larvae are parasitoids of snails (terrestrial Gastropodes).

Grey, small to medium-sized species, 3rd antennomere usually 1.2-2 times longer than 2nd, arista plumose or at least shortly haired. Postsutural dc 3, rarely 4 pairs, rather strong. Abdominal segment V of ♂ genitalia Y-formed, with spinolate brush, segment VII+VIII usually elongate, 1.5-2.5 times longer than broad, epandrium usually with prolongate hind ventral margin. Pregonite narrow and long, postgonite hook-formed. Basiphallus elongate, epiphallus absent. Membranal process membranous, unpaired, either elongate spine-like or in form of a process. Ventral plates well developed, with or without lateral arms. Abdominal tergite VI usually complete, rarely divided into paired lateral plates, tergites VII-X usually reduced, sternite VI elongate.

## Genus *Discachaeta* Enderlein, 1928

Arch. klassif. phylog. Ent. 1: 30.
**Type species:** *Sarcophaga cucullans* Pandellé, 1896.

### Description

Generally similar to *Heteronychia* B. B., but ♂ genitalia distinctly different by strongly sclerotized apical plate with elongate lateral arms.

Body length 3-13 mm.

♂ frons at narrowest part 0.2-0.3, in ♀s 0.3-0.4 of head width. 3rd antennomere 1.2-1.5 times longer than 2nd, basal part (0.3-0.4 of its length) inflated, plumose. Frontal vitta widening ventrally, in ♀ parallel-sided. Parafacial at antennal base 0.2-0.3 and gena 0.2-0.4 eye height. Parafacial with 2-3 rows of short setae, vte in ♂ poorly developed, in ♀ strong; fr 5-9, strong and crossed. Parafacial bristles not longer than parafacial width.Occiput with grey or whitish hairs. dc 2-3+3, strong; ia 0-1+2, h 3, ph 1-2 npl 2 long + 2 short, spl 1+1+1 or 2+1. Scutellum with strong bas and subap, 1-2 pairs of more or less developed d, apical bristles weak, sometimes absent. ♂ mid-femoral ctenidium absent, mid femoral organ in ♀s absent or located distally. All femora, mid- and hind tibia with more or less distinct, long ventral hairs. Costal spine well developed, $r_1$ bar, occasionally (in *D. amita*) with hairs. 3rd costal section moderately longer than 5th, m-cu sigmoid, in some cases nearly straight. Abdominal sternites II-III in ♂ long haired, sternite IV shortly haired. Apical plate of ♂ distiphallus big and robust with well sclerotized slender lateral arms. Ventral processes well developed, elongate.

Body dark with slight pollinosity, head silvery white or yellowish grey pollinose, frontal vitta black, antenna and palpus black, thorax grey or yellowish grey dusted, blackish longitudinal stripes on mesonotum well developed, legs black, wings hyaline, basicosta and epaulet yellow, squama white. Abdomen grey with chequered pattern. Abdominal segment VII+VIII in ♂ black lustrous, epandrium usually red, sometimes brownish red, rarely black. Abdominal sternite VI in ♀ reddish or black. 5 species are distributed in Europe and North Africa.

**Reference:** Verves 1993: Fliegen palaearkt. Reg., 11 (64 h.) Lf. 311: 491-496.

### Key to species of *Discachaeta*

1. $r_1$ haired, cercus very broad (Fig. 153) ........ *D. amita* (Rond.)
– r bare, cercus narrow(er) ........ 2.
2. Cercus with very acute dorsal spine apically. Ventral processes broad with apex obtuse and shortly haired (Figs 154, 165) ........ *D. cucullans* (Pand.)
– Cercus without dorsal spine, ventral processes elongate and pointed ........ 3.
3. Cercus straight, towards tip very narrow (Fig. 163) ........ *D. arcipes* (Pand.)
– Cercus tip slightly curved ventrally, not very narrow (Fig. 164) ........ *D. pumila* (Meig.)

### *Discachaeta amita* (Rondani, 1860)

Atti Soc. ital. Sci. nat. 3: 391 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.2-0.21, at vertex 0.27 and at antennal base 0.3-0.32 head width. Frontal vitta 1.5 widening frontodorsally, frons middle 3 times wider than one parafrontal. 3rd antennomere 1.2-1.3 times longer than 2nd. Parafacial at antennal base 0.19-0.2 and gena 0.24-0.27 eye height; fr 5-7, facial ridge with few short setae at ventral 0.2-0.3. Parafrontal and parafacial silvery grey or silvery white dusted, gena slightly grey pollinose. Propleuron bare, scutellum with short, crossed ap, discals poorly developed. $r_1$ with short bristles basally; thorax with slight yellowish grey dusted. Abdominal tergite III without mediomarginals. Cercus very broad and short, apically pointed, almost straight; distiphallus broad, apical plate broad, apically pointed, ventral processes hook-formed, well sclerotized. Epandrium lustrous red or brownish red (Fig. 153).

♀. Frons 0.4 of head width, abdominal tergite VI complete, with elongate marginal bristles.

Body length 6-10 mm.

**Distribution:** Italy, southern France, southern Germany and Hungary. Ecology unknown.

### *Discachaeta arcipes* (Pandellé, 1896)

Revue Ent. 15: 184 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.18-0.3, at vertex 0.24-0.26 and at antennal base 0.35-0.4 head width. Frontal vitta 2-2.5 times widening frontoventrally, frons middle 1.5-2.5 times wider than one parafrontal. 3rd antennomere 1.2-1.4 times longer than 2nd. Parafacial at antennal base 0.2-0.22 and gena 0.22-0.26 eye height, vte well developed, strong, fr 6-9, facial ridge shortly bristled at lower 0.3-0.4. Parafrontal and parafacial densely silvery white dusted. Propleuron bare. ac 0+1. Scutellum with small crossed ap and one pair of discal bristles. $r_1$ bare. Thorax yellowish grey pollinose. Abdominal tergite III vithout mediomarginals. Cercus narrow, almost straight apex pointed and narrow. Apical plate elongate, lateral arms long and almost straight, ventral process hook-formed (Fig. 163).

♀. Frons 0.3-0.35 head width. Abdominal tergite VI complete, reddish.

Body length 6.5-12 mm.

**Distribution:** Central and southern Europe, from Britain to Ukraine. The species accompanies or prefers limestone and loess habitats with shrubs and is thermophilous. Larvae are parasites of the snails *Euomphalia strigella* Drap. (Povolný & Groschaft 1959), *Helicella obvia* Menke (Verves & Kuzmovich 1979) and most likely of further helicids.

## *Discachaeta cucullans* (Pandellé, 1896)

Revue Ent. 15: 184 *(Sarcophaga)*.

**Description**

♂. Frons at narrowest part 0.25-0.28, at vertex 0.28-0.31 and at antennal base 0.43-0.48 head width. Frontal vitta 1.2-1.4 times wider frontoventrally. Frons at middle 1.1-1.5 times width of one parafrontal. 3rd antennomere 1.2-1.3 times longer than 2nd. Parafacial at antennal base 0.25-0.28 and gena 0.22-0.26 eye height. vte poorly developed. fr 6-8, facial ridge with several fine hairs on angular ledge. Head densely silvery white pollinose. Propleuron bare. ac 2-3+1. Scutellum with weak and crossed ap and 1-2 discal pairs. Cercus profile medium-width, with preapical strong indentation dorsally. Apical plate medium length, strongly curved ventrally, ventral processes (profile) broad and not pointed apically, with numerous short hairs on ventral surface (Figs 154, 165). Epandrium yellowish red or dark red.

♂. Frons 0.35-0.4 of head width, frontal vitta as broad as parafrontal. Mid-femur organ well developed, situated apically. Abdominal tergite VI divided into two lateral ovate plates each 1.5-0.5 times longer than broad, with long marginals on interior part and with numerous exterior hairs. Mid-femur organ reddish brown, abdominal tergite VI red or brownish red.

Body length 6-13 mm.

**Distribution:** Spain, France, Italy, Switzerland, southern Moravia and Slovakia, Hungary, Balkan countries, southern Ukraine, southern Russia and Northern Caucasus, Georgia (Gruzia), Armenia and Azerbaijan. The species accompanies limestone habitats or very warm habitats in forest-steppes, sometimes in vicinity of rivers. Bionomics is unknown, but most likely the species is a parasitoid of snails.

## *Discachaeta pumila* (Meigen, 1826)

Syst. Beschr. 5: 24 *(Sarcophaga)*.

*Sarcophaga inermis* Strobl, 1894. Mitt. naturw. Ver. Steierm. 30: 63.
*Sarcophaga latigena* Pandellé, 1896. Revue Ent. 15: 199.

**Description**

♂. Frons at narrowest part 0.18-0.21, at vertex 0.23-0.26 and at antennal base 0.3-0.34 head width. Frontal vitta 1.5-2 times wider frontoventrally, 1.3-1.8 times wider than parafrontal. 3rd antennomere 1.1-1.3 times longer than 2nd. Parafacial at antennal base 0.18-0.22 and gena 0.29-0.35 eye heigh, vte well developed, medium-length, fr 6-9, facial ridge shortly bristled at 0.2-0.3 of its basal (ventral) part. Head intensive grey or yellowish grey dusted. Propleuron bare. ac 0+0-1. Scutellum without ap, with one pair of short discals. $r_1$ bare. Cercus almost straight, at apex moderately curved ventrally. Ventral processes hook-formed, lateral arms of apical plate distinctly sigmoid (Fig. 164). Epandrium red, brownish or black.

♀. Frons 0.3-0.34 of head width. Mid-femoral organ absent. Abdominal tergite VI complete, with a slight dorsal indentation, black or reddish.

Body length 3-8 mm.

**Distribution:** The species is widely distributed in western Europe and common especially in the British Isles, France and Germany accompanying humid (lowland) forests. It becomes rare in highear elevations and in the mountains, although it might occur also in (coniferous) montane stands of the Carpathians and the Alps (up to 1.800 m). Where the continentality of the climate increases the species becomes rare. It reaches its eastern limits in Ukraine and is known to occur also in North Africa. Ecology is not known.

### Genus *Heteronychia* Brauer & Begrenstamm, 1889

Denkschr. Akad. Wiss. Wien 56: 168.
**Type species:** *Heteronychia chaetoneura* Brauer & Bergenstamm, 1889 (syn. of *Sarcophaga dissimilis* Meigen, 1826).

**References.** Rohdendorf 1965: Ent. Obozr. 44: 683-693; Mihályi 1979: Fauna hung. 15: 140-151; Verves 1986: Cat. Palaearct. Dipt., 12: 146-157; Pape 1987: Fauna ent. scand. 19: 133-144.

*Pierretia* Enderlein, 1928. Arch. klassif. Phylog. Ent. 1: 47 (not Robineau-Desvoidy, 1863).
**Type species:** *Sarcophaga haemorrhoa* Meigen, 1826.

*Eupierretia* Rohdendorf, 1937. Fauna SSSR 19: 149.
**Type species:** *Sarcophaga proxima* Rondani, 1860.

*Spatulapica* Fan, 1964. Acta zootaxon. sinica 1: 313.
**Type species:** *Sarcophaga haemorhoa* Meigen 1826.

Small to medium-sized flies (3-14 mm) with grey coloration. ♂ frons narrow, in ♀ usually as broad as eye. 3rd antennomere 1.1-2 times longer than 2nd. Arista plumose or shortly haired, inflated in basal 0.2-0.4. Frontal vitta in ♂ widening frontoventrally, parallel-sided in ♀. Parafacial medium-width, gena comparatively narrow, ♂ vte both well developed or absent, in ♀ well developed. fr strong and crossed, parafacial with 1-2 rows of medium length bristles, occiput haired whitish or yellowish. Parafrontal and parafacial densely bright dusted, frontal vitta blacks or brownish black. Antenna and palpus black, occasionally reddish or brownish. Propleuron bare. ia 0-1+2, h 3-4, ph 1-2, npl 2 long +1-4 short, spl 1+1+1 or 2-3+1. Scutellum with strong and long bas and subap, ap both present or absent, discal setae 1-2 pairs, $t_2$ with 2-3 ad. Ctenidium usually absent, rarely present. Mid-femoral organ in ♀s absent or situated apically. All ♂ femora, $t_3$ and sometimes $t_2$ with more or less numerous long hairs. $R_5$ usually open, in rare instances closed. $r_1$ bare or with bristles, $r_{4+5}$ bristled basally. Thorax lightly dusted, black longitudinal stripes on mesonotum more or less distinct. Legs black, sometimes brown, wings hyaline. Abdomen with chequered pattern, sometimes lustrous black (e.g. *Heteronychia dissimilis* and others). Segment VII+VIII of ♂ genitalia usually with marginals, basiphallus elongate, apical plate well developed, lateral arms small, elongate, membranous spatulate or absent. Ventral plates well developed, usually with apophyses. Abdominal tergites VII-X absent in ♀. Epandrium red, brown or red. ♀ with abdominal tergite VI black or red.

The genus comprises 6 palaearctic subgenera and about 80 species. 24 species are present in central Europe (Czech Republic, incl. adjacent countries). The species of this genus are usually parasitoids of snails.

### Key to subgenera and species of *Heteronychia*

1. Ventral plate very broad, apex rounded, without arms ........ 2.
– Ventral plate narrower and with apical arms ........ 3.

2. Apical plate short with distinct membranous, rounded, but short blister-shaped lateral lobe; cercus narrow and almost straight (Fig. 173) ........ *Heteronychia* (subg. *Boettcherella*) *mutila* (Vill.)
– Apical plate with elongate, strikingly protruding tip, without membranous blister-shaped lobe, cercus broad (Fig. 195) ........ *Heteronychia* (subg. *Pandelleola* Rohd.) *filia* (Rond.)

3. Apical plate elongate, stout and obtusely rounded, with distinct petiolate lateral arms; $r_1$ bare; cercus distinctly saddled ........ *Heteronychia* (subg. *Ctenodasypygia*) *minima* (Rond.)
– Apical plate narrow, mid-long, lateral arms rod-like, long or short, spatulate (or spatulate petiolate) and membranous with cercus moderately saddled and tipped ........ *Heteronychia* s. str., incl. subgenus *Spatulapica* Fan

**Key to species of *Heteronychia* (s. str. including subg. *Spatulapica* Fan)**

1. Lateral arms of apical plate elongate, apex widened, spoon-shaped, $r_1$ still haired ....................... 2.
– Lateral arms of apical plate short or absent, not spoon-shaped ....................... 8.

2. Stylus at apex strikingly widened ....................... 3.
– Stylus apically not widened ....................... 4.

3. Apical plate shorter than its lateral arms, straight (Fig. 178) ............. *H. rohdendorfi* (Pov. & Slam.)
– Apical plate as long as its lateral arms or shorter, more of less sigmoid curved (Fig. 179) ....................... *H. slovaca* Pov. & Slam.

4. Apical plate longer or as long as its lateral arms ....................... 5.
– Apical plate distinctly shorter than its lateral arms (Figs 180-183) ....................... 7.

5. Distiphallus not shortened, but distinctly longer than broad (high) (Fig. 177) ....................... *H. ancilla* (Rond.)
– Distiphallus not shortened, but distinctly longer than broad (tall) ....................... 6.

6. Cercus profile apically parallel-sided, apex rounded, dorsal protuberance situated medially between cercus apex and distal angle of surstylus (Fig. 183) ....................... *H. haemorrhoa* (Meig.)
– Cercus profile apically narrow and pointed, dorsal protuberance situated closer to apex than to surstylus (Fig. 182) ....................... *H. haemorrhoides* (Bött.)

7. Epandrium black (Fig. 180) ....................... *H. depressifrons* (Zett.)
– Epandrium red (Fig. 181) ....................... *H. boettcheriana* (Rohd.)

8. Praegonites obtuse and usually widened apically ....................... 9.
– Praegonites apically narrow and pointed ....................... 14.

9. Ventral arms of distiphallus very long and thin, bristle-like (Fig. 191) ................ *H. schineri* (Bezzi)
– Ventral arms of distiphallus short, beak-like ....................... 10.

10. Lateral arms of apical plate long and narrow, sigmoid, apically close to medial plate of apical plate (Fig. 186) ....................... *H. cepelaki* Pov. & Slam.
– Lateral arms short or absent ....................... 11.

11. Cercus profile dorsally inflated, apical part narrow, tip rounded (Fig. 192) ....................... *H. pauciseta* (Pand.)
– Cercus without dorsal inflation, apically pointed ....................... 12.

12. Cercus apically prolongate and pregonites sigmoid, apical plate elongate, stick-like (Fig. 176) .... ....................... *H. rondaniana* (Rohg.)
– Cercus apically not prolonged ....................... 13.

13. Apical part of cercus medium-length, slightly curved ventrally; apical plate narrow, tip pointed; pregonites apically not widened (Fig. 184) ....................... *H. proxima* (Rond.)
– Apical part of cercus shortened, distinctly curved ventrally, apical plate broad, tip obtuse; pregonites distinctly widening apically (Fig. 185) ....................... *H. lednicensis* Pov.

14. Cercus profile with distinct dorsal inflation; lateral arms of apical plate well developed, stick-like (Fig. 199) ....................... *H. infixa* (Bött.)

– Cercus profile without distinct inflation; lateral srms of apical plate poorly developed or absent ....................... 15.

15. Cercus narrow, almost straight, ventral arms of distiphallus very long ....................... 16.
– Cercus broad, more or less curved ventrally ....................... 19.

16. $r_1$ bare, epandrium red ........................................................................................................ 17.
– $r_1$ hairy, epandrium black ........................................................................................................ 18.

17. Cercus with apex distinctly pointed; membranal process strongly protruding (Fig. 190) ............... ........................................................................................................ *H. porrecta* (Bött.)
– Cercus more or less obtuse apically, mebranal process (protuberance) not protruding (Fig. 189). ........................................................................................................ *H. vicina* (Mcq.)

18. Apical part of cercus profile prolongate, straight, with tip obtuse, digitate (Fig. 187) .................... ........................................................................................................ *H. rohdendorfiana* Mih.
– Apical part of cercus profile not strongly prolongate and less protruding not straight, but moderately curved and shorter, tip not digitate ........................................................ *H. dissimilis* (Meig.)

19. Cercus profile short and broad, almost straight, wedge-shaped; membranal arm stick-like, well sclerotized (Fig. 193) ........................................................................................ *H. hirticrus* (Pand.)
– Cercus profile not very broad, more or less elongate; membranal arm awl-shaped, membranous ........................................................................................................ 20.

20. Cercus apically with slight tip indentation, membranal process robust, protruding and sclerotized, ventral arms of distiphallus short; epandrium reddish (Fig. 194) ......................... *H. vagans* (Meig.)
– Cercus without apical indentation, membranal process (protuberance) small, not protruding, membranous; ventral arms big and elongate; epandrium black (Figs 174, 175) ................................ ........................................................................................................ *H. bezziana* (Bött.)

## Subgenus *Boettcherella* Enderlein, 1928

Arch. klassif. phylog. Ent. 1: 49.
**Type species:** *Sarcophaga setinervis* Rondani, 1860.

**References:** Rohdendorf 1937: Fauna SSSR 19: 336-340; Povolný & Verves 1990: Acta ent. Mus. Natn. Pragae 43: 312-317; Verves 1993: Fliegen palaearkt. Reg. 11 (64 h) Lf. 331: 499-502.

Thorax with 3 postsutural dc, ac 2-4 plus 1, $r_1$ usually haired, sometimes *(H. boettcheri)* bare. ♂ with abdominal segment VII+VIII with marginal bristles. Apical part of cercus strongly narrowed, apex pointed. Basiphallus elongate, not very broad. Membranal arms short, spine-like and straight. Ventral plate very broad, well sclerotized, without pointed arms. Apical plate of distiphallus big with well developed lateral arms. Ctenidium absent. ♀ with abdominal tergite VI complete, sternites VI and VII elongate. Three essentially mediterranean species ranging to central Asia.

### *Heteronychia (Boettcherella) mutila* (Villeneuve, 1912)

Ann. Mus. Nat. hung. 10: 611 *(Sarcophaga).*

*Heteronychia nedelkoffi* Lehrer, 1977. Acta zool. bulg. 3: 32.

**Description**

♂. Frons at narrowest part 0.15-0.22, at vertex 0.19-0.24 and at antennal base 0.31-0.35 head width. Frontal vitta 1.2-1.5 times wider frontoventrally, frons at middle 2-3 times wider than one parafrontal. 3rd antennomere 1.2-1.8 times longer than 2nd. Parafacial at level of antennal base 0.2-0.24 and gena 0.20-0.25 eye height. 2-3 rows of postorbitals; vte short but well developed, fr 5-9, strong and crossed, one row of medium-length parafacial bristles. Scutellum without ap, 1-2 pairs of fine discals. $r_1$ haired at basal half. Abdominal tergite III without mediomarginal bristles. Cercus narrow and elongate, almost straight, lateral arms of apical plate elongate and narrow (Fig. 173), epandrium lustrous red or brownish red.

♀. Frons 0.34-0.38 of head width. Frontal vitta parallel-sided, 1.5-2 times as wide as parafrontal. Middle femora organ absent. Abdominal sternite VIII well sclerotized, with numerous spinose short

bristles. Tergite VI red.

Body length 4.5-9.5 mm.

**Distribution:** The species accompanies rather undisturbed xerothermophilous habitats, especially on limestone with forest steppe or open steppe vegetation. It occurs in all Balkan countries and is locally common, reaching its northern limit in southern Slovakia. It is known also from Cyprus, southern Ukraine, northern part of Caucasus, Georgia and Armenia. The species is endangered like many xerothermophilous taxa in its northern limits, where it is rare (Hungary and Slovakia). Larvae are parasitoids of helicoid snails.

## Subgenus *Heteronychia* s. str.

*Eupierretia* Rohdendorf, 1937. Fauna SSSR, 19: 363.
**Type-species:** *Sarcophaga proxima* Rondani, 1860.

*Spatulapica* Fan, 1964. Acta zootaxon. sin. 1: 313.
**Type-species:** *Sarcophaga haemorrhoa* Meigen, 1826 (partly recognized as subgenus).

Grey flies of different size (3-14 mm). Postorbital setae 1-3 rows, parafacials mid-long, sometimes both short or longer than parafacial width. Ctenidium usually well developed; 3-4 postsutural dc; propleuron bare, $r_1$ both bare or setose. ♂ genitalia with ventral processes apically pointed, more or less elongate; apical plate long or short, not widening, lateral apical processes often absent, slender straight or moderately curved spine- or rod-shaped. ♀ 6th abdominal tergite usually complete, sometimes centrally separated into a pair of lateral lobes. More than 60 Palaearctic species; 20 central European species. Larvae are parazitoids of terrestrial snails. The species of partly recognized subgenus *Spatulapica* show a lobate, sometimes petiolate subterminal membrane on apical plate, and show a saddled cercus with convexity on dorsal edge preapically.

## *Heteronychia* (s. str.) *ancilla* (Rondani, 1865)

Atti Soc. ital. Sci. nat. 8: 226 *(Sarcophaga)*.

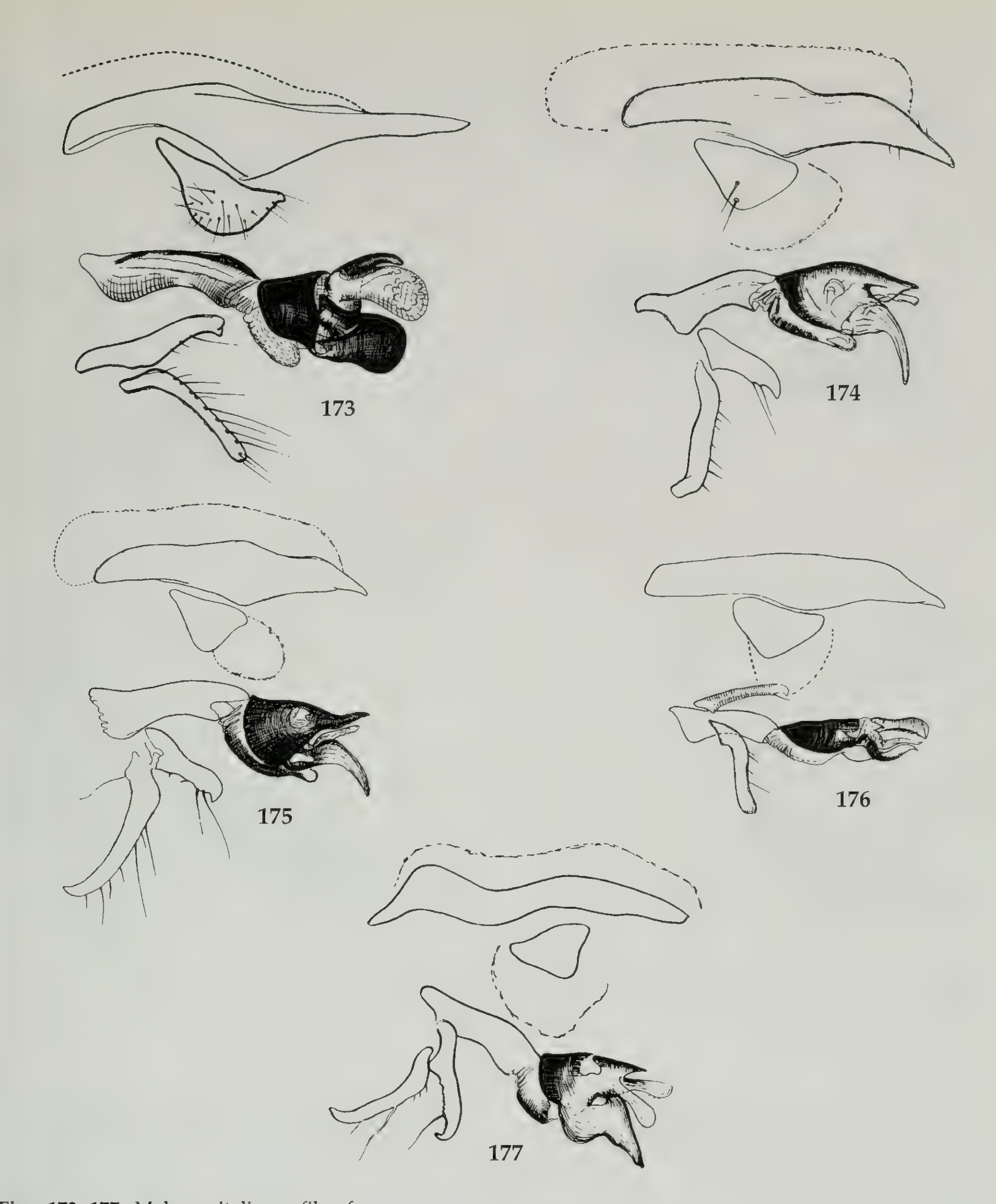
*Heteronychia belanovskyi* Verves, 1973. Proc. Acad. Sci. Ukr. SSR, B 10: 946.
*Heteronychia povolnyi* Mihályi, 1975. Acta Acad. Aci. hung. 21 (1-2): 104.

### Description

♂. Frons at narrowest part 0.17-0.20, at vertex 0.25-0.28 and at antennal base 0.31-0.35 head width. Frontal vitta 1.2-1.5 times wider forwards, frons middle 2.5-3.5 times wider than parafrontal, 3rd antennomere 1.5-1.8 times longer than 2nd. Parafacial at level of antennal base 0.25-0.27 and gena 0.24-0.32 eye height. 2-3 rows of postorbitals, vte short but well developed, fr 6-9, strong and crossed, one row of medium-length parafacial bristles. Palpus long, apex moderately inflated ac 0-2+1. Propleuron bare. Scutellum with well developed short ap-bristles, dense setose. Costal spine well developed, $r_1$ with 2-6 bristles in basal 0.2-0.5, $R_5$ open, m-cu moderately sigmoid or nearly straight; ratio between 3rd and 5th costal sections 1 : 0.7-0.9; abdominal tergite III without mediomarginals, sternite II and III with long hairs, sternite IV with short setae. "Brush" on sternita V poorly developed. Segments VII+VIII with row of marginals. Cercus profile with distinct dorsal inflation, with straight apex, wedge-shaped (Fig. 177). Pregonite prolongate with obtuse apex. Distiphallus short and tall, ventral processes short hook-formed. Lateral arms of apical plate well developed, spoon-shaped. Body ground coloration bright grey, parafrontal and parafacial densely silvery dusted, frontal vitta, antenna and palpus black, mesonotum with black longitudinal stripes, abdomen with chequaered pattern distinct. Legs black, wings hyaline. Epandrium red, brownish or black, Segments VII+VIII black, lustrous (Fig. 177).

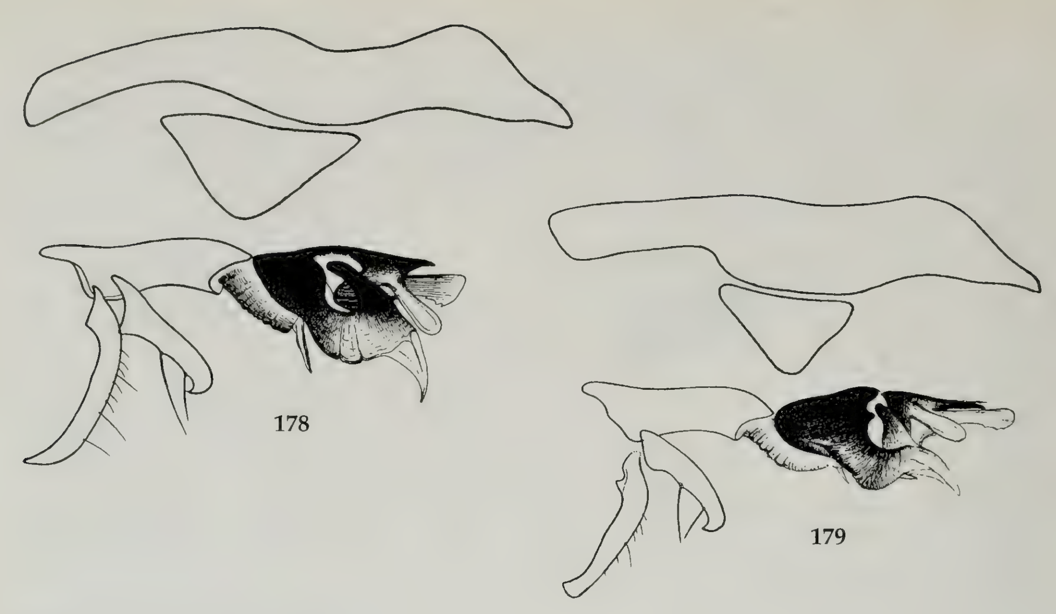
♀. Frons 0.3-0.32 head width. Frontal vitta rather parallelsided, as wide as parafrontal; scutellum without ap. Mid-femoral organ very small, black, situated at apical third. Abdominal tergite VI complete, with long marginals, black or reddish at hind margin.

Body length 3.5-7 mm (rarely more).




**Figs. 173.-177.** Male genitalia profile of:
**Fig. 173.** *Heteronychia mutila*
**Fig. 174.** *Heteronychia bezziana*
**Fig. 175.** *Heteronychia bezziana* to demonstrate genitalia variation of this species
**Fig. 176.** *Heteronychia rondaniana* (*depressifrons* auct.)
**Fig. 177.** *Heteronychia ancilla* (from a robust individual)

**Distribution:** Italy, all Balkan countries, Hungary, Slovakia, Moravia, Austria (northern borderline), Russia (Voroněž Region, northern Caucasus), Georgia (Gruzia), Armenia and Azerbaijan. This is a thermophilic and obviously heliophilic species accompanying forest steppe and steppe habitats in its northern central European limits (Hungary, Slovakia, Moravia). In the Balkans and Alps it occurs in




**Figs. 178.-179.** Male genitalia profile of:
**Fig. 178.** *Heteronychia rohdendorfi*
**Fig. 179.** *Heteronychia slovaca*

rather montane or xeromotane habitats with thin vegetation of shrubs, preferring dry soils (limestone habitats, loess). Montane populations consist usually of stouter individuals than in lowland habitats where the species occurs mostly in spring and late summer.

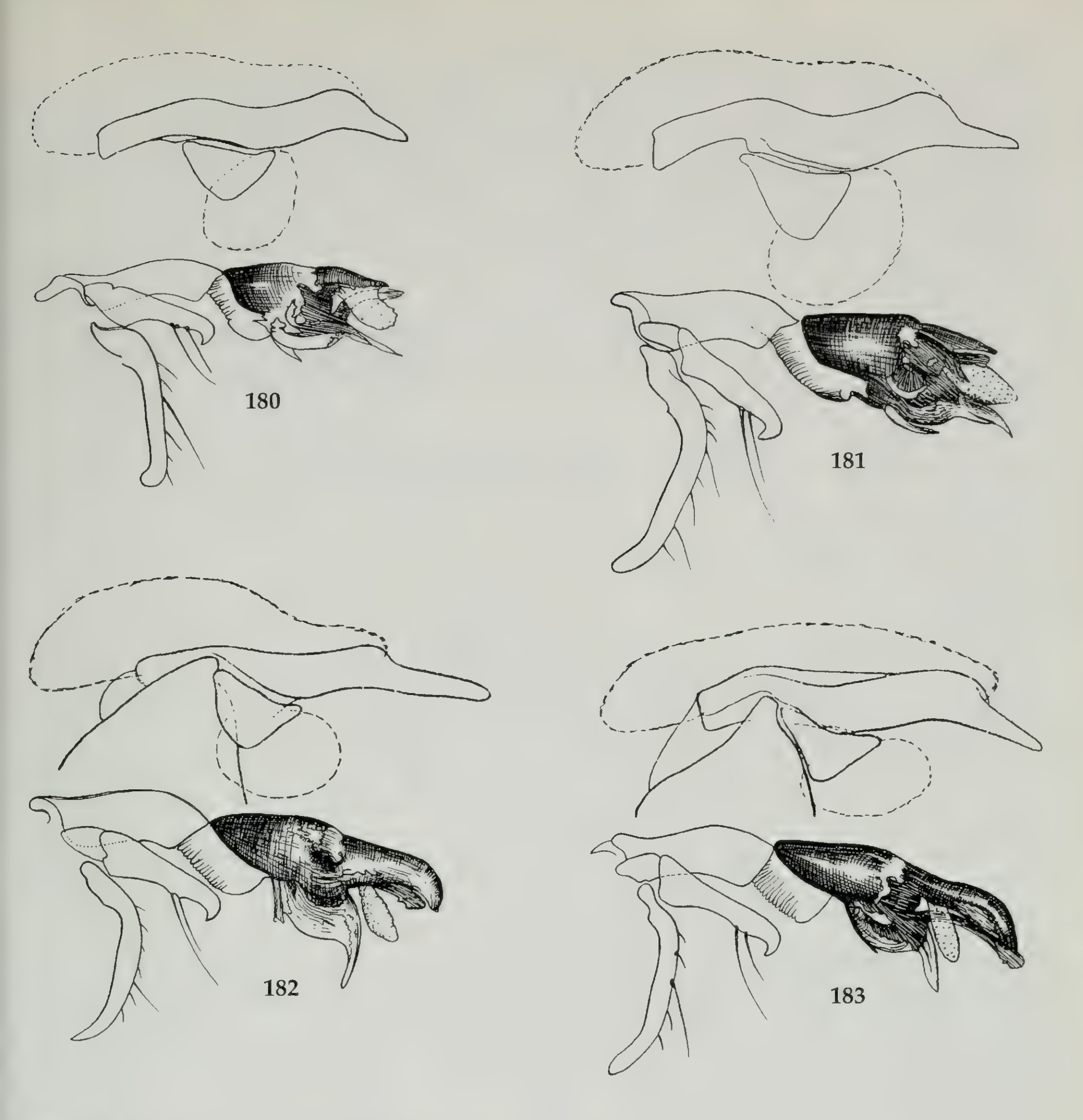
### *Heteronychia* (s. str.) *bezziana* (Böttcher, 1913)

Dt. Ent. Z. 3: 242 *(Sarcophaga).*

*Heteronychia* (s. str.) *ostensackeni* Rohdendorf, 1937. Fauna SSSR 19 (1): 353.
*Heteronychia drenskiana* Lehrer, 1977. Acta zool. bulg. 7: 34.
*Heteronychia vachai* Povolný, 1986. Acta Univ. Agric. (Brno) ser. A, 34: 233-236.

**Description**

♂. Frons at narrowest part 0.15-0.17, at vertex 0.19-0.24 and at antennal base 0.34-0.4 head width; frontal vitta 2.5-4 times widening frontoventrally, frons middle 2-3.5 times wider than parafrontal; 3rd antennomere 1.2-1.5 times longer than 2nd; parafacial at antennal base 0.2-0.22 and gena 0.24-0.3 eye height; palpus medium-length; 2 rows of postorbital setae, vte usually distinct, fr 6-10, strong and long; one row of parafacial bristles, lower ones longer than parafacial width; facial ridge with several black setae at lower part; ac 1-2+1, delicate; propleuron bare; scutellum with very fine ap possibly missing, and with one pair of d; ctenidium absent, $f_3$ with short and dense ventral hairs, $t_3$ with a single row of long pv. Costal spine short and fine, $R_5$ both open or closed, $r_1$ with 1-3 basal hairs or bare, ratio between 3rd and 5th costal sections 1 : 1.2-1.5. Abdominal tergite III with pair of mediomarginals which are sometimes very fime or absent; abdominal starnites II and III with long erect hairs, sternite IV short setose; segment VII+VIII with long marginals. Cercus medium-thick, dorsal edge sigmoid, sometimes preapically moderately inflated, apex pointed and moderately curved ventrally; pregonite medium-length, almost straight, with apex obtuse, dorsally with several bristles, postgonite moderately shorter, hook-shaped, with 1-2 short ventral bristles; membrane distinctly inflated, poorly sclerotized, distiphallus short and inflated, ventral lobes big, with wider basis, apically pointed, distinctly curved, hook-shaped, apical plate medium-length, apex narrow and pointed with short dentate lateral arms;




**Figs. 180.-183.** Male genitalia profile of:
**Fig. 180.** *Heteronychia depressifrons* (*obscurata* auct.)
**Fig. 181.** *Heteronychia boettcheriana*
**Fig. 182.** *Heteronychia haemorrhoides*
**Fig. 183.** *Heteronychia haemorrhoa*

stylus narrow, medium length, sigmoid (Figs 173, 174).

Body ground coloration dark grey; head blackish, parafrontal and parafacial silvery grey dusted; thorax black lustrous with grey pollinosity, mesonotal longitudinal stripes broad; legs black, wings hyaline, most part fumose, basicosta and épaulet yellow or brownish yellow; abdomen mostly black lustrous, sometimes with little distinct chequering pattern; genitalia lustrous black, segments VII + VIII with posterior spot of grey pollinosity.

♀. Frons 0.3-0.35 head width, mid femoral organ indistinct abdominal tergite VI complete and with a row of strong marginals, black.

Body length 3.5-6.5 mm.

**Distribution:** Limestone districts of the Alps, Carpathians and Balkans, occurring in Switzerland, Italy, Bavaria, Austria, Slovenia, Croatia, Serbia, Rumania, Bulgaria, Greece, Czechia, Slovakia and Poland. In alpine habitats the species accompanies limestone cliffs in montane forests, usually not exceeding the timberline. It may also occur in extrazonal (demontane) formations at elevations between 400-500 m (Central Bohemia – Bohemian Karst). In Dalmatia and in Greece the species occurs on coastal limestone cliffs, especially during spring or early summer; it is also known from southern Sweden and Norway. Occasionaly individual specimens may be taken in limestone habitats at lower elevations, but generally the species is montane and populations can reach considerable denstities in some montane habitats. It is a parasitoid of snails of the genera *Chondrina* and *Clausilia* (Povolný & Verves 1990).

The flies are usually small and delicate, but may show considerable variation both in size and particularly in chaetotasy, body and genitalia proportions (a cause of confusion in identification and numerous synonyms).

### *Heteronychia* (s. str.) *boettcheriana* (Rohdendorf, 1937)

Fauna SSSR 19, 1: 345 *(Pierretia).*

*Heteronychia fraterna* Lehrer, 1977. Acta zool. bulg. 7: 27.

**Description**

♂. Frons at narrowest part 0.13-0.21, at vertex 0.15-0.30 and at antennal base 0.28-0.4 head width. Frontal vitta 1.5-2.5 times wider frontally, frons middle 1.5-3 times wider than parafrontal. 3rd antennomere 1.1-1.8 times longer than 2nd. Parafacial at level of antennal base 0.18-0.27 and gena 0.21-0.41 eye height. Palpus medium-length, thin, not inflated apically, 2-3 rows of postorbital setae, vte present, or short, fr 7-11, strong and crossed, facial ridge shortly haired at lower 0.3-0.4; parafacial with one row of bristles, upper setae short and fine, lower bristles strong, longer than parafacial width; ac 0-3+1. Propleuron bare; scutellum with crossed ap, one pair of d; ctenidium absent, all femora and hind tibia with not very dense ventral setae; costal spine well developed, $r_1$ with 5-10 setae at basal 0.4-0.5; $R_5$ open, ratio between 3rd and 5th costal section 1 : 0.8-1.2, m-cu sigmoid; abdominal tergite III with one pair of strong marginals. Segment VII+VIII with 4-6 marginals. Cercus moderately curved ventrally, with distinct dorsal inflation preapically, and with short pointed apical arm. Pregonite prolonged, ends distinctly curved, medium-length, awl-shaped (Fig. 181). Body colour dark grey. Parafrontal and parafacial densely whitish grey pollinose; frontal vitta, antenna and palpus black; thorax grey or yellowish grey dusted with black longitudinal stripes on mesonotum; legs black, wings hyaline, slightly yellowish to brownish basally; basicosta and epaulet yellow; abdomen silvery grey dusted, dark chequered pattern distinct. Segments VII+VIII lustrous black, epandrium usually red or brownish (Fig. 181).

Body length 5.5-12 mm.

♀ unknown.

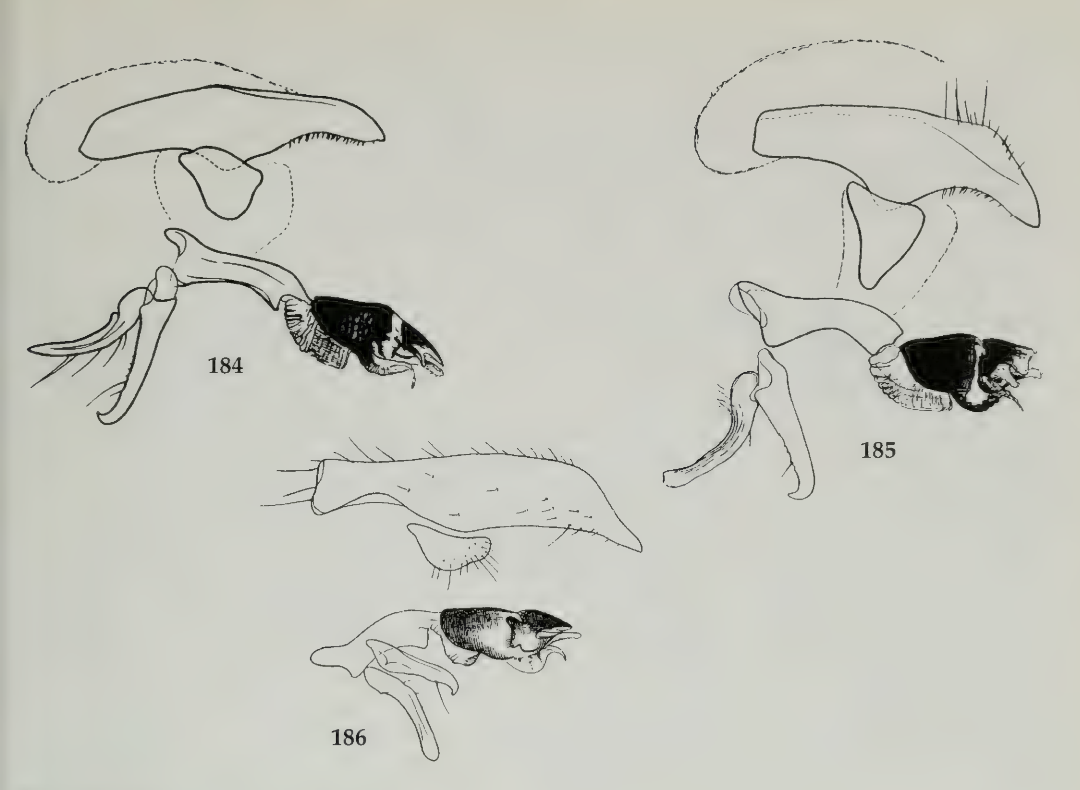
**Distribution:** Widely distributed in Europe to southern Sweden and Norway, and eastwards to the Urals and Transcaucasia. Absent from the British Isles. The flies accompany warm and thin lowground forests and river valeys including the lower vegetation tiers. This is an essentially forest species.

### *Heteronychia* (s. str.) *cepelaki* Povolný & Slamečková, 1970

Acta ent. bohemoslovaca 67: 331.

**Description**

♂. Frons at narrowest part 0.17-0.2, at vertex 0.25-0.27 and at level of antennal base 0.31-0.38 head width. Frontal vitta 2 times wider frontoventrally, frons middle 1.5-5 times wider than one parafrontal. 3rd antennomere 1.3-1.5 times longer than 2nd. Parafacial at level of antennal base 0.22-0.35 and gena 0.25-0.3 eye height. 2-3 rows of postorbital setae, vte short but distinct, fr 7-9, strong and crossed,




**Figs. 184.-186.** Male genitalia profile of:
**Fig. 184.** *Heteronychia proxima*
**Fig. 185.** *Heteronychia lednicensis*
**Fig. 186.** *Heteronychia cepelaki*

parafacial with one row of short setae, facial ridge shortly haired, upper angular vi; ac 2+1. Propleuron bare. Scutellum with well developed crossed ap, d absent; ctenidium absent; $f_3$ with a row of strong ad. $R_5$ open, $r_1$ bare, m-vein bluntly angled, m-cu comparatively straight; costal spine well developed, ratio between 3rd and 5th costal sections 1:1.2-1.4. Abdominal tergite III with pair of long mediomarginals, sternites II-IV long setose. Segment VII+VIII with row of long marginal bristles. Cercus apically pointed, without dorsal inflation, slightly curved ventrally. Pregonites moderately curved, tips obtuse. Membrane distinctly widened, distiphallus comparatively long, ventral arms delicate, hook-shaped, apical plate elongate, mostly straight, apex pointed, lateral arms long, dorsal wall curved (Fig. 186). Ground coloration deeply grey to dark grey, parafrontal and parafacial silvery dusted, frontal vitta, antenna and palpus black, thorax grey pollinose, longitudinal stripes on mesonotum distinct, legs black, wings hyaline, base brownish. Abdominal pattern dark chequered. Genitalia entirely black lustrous (Fig. 186).

♀ unknown.

Body length 4.5-5.5 mm.

**Distribution:** (West) Carpathian limestone cliffs and rocky sites at border of timberline, locally common (e.g. in Malá Fatra Mountains of Central Slovakia and Ukraine), limestone ranges of the Alps (Kärnten, Steiermark, Lunzer Alpen), at elevations of about 1.200-1.400 m a.s.l. The species is probably a parasitoid of small (clausiliid) snails.

### *Heteronychia* (s. str.) *depressifrons* (Zetterstedt, 1845)

Dipt. Scand. 4: 1293 *(Sarcophaga).*

*Pierretia obscurata* (Rohdendorf, 1937). Fauna SSSR, 19 (1): 346.
*Sarcophaga parva* Quo, 1952. Acta ent. sinica 2 (1): 67.
*Heteronychia quoi* Fan, 1964. Acta zootaxon. sinica 1 (2): 313.
*Heteronychia petrovae* Artamonov, 1980. Syst. ecol. anim. (Novosibirsk) 151.

**Description**

♂. Frons at narrowest part 0.13-0.2, at vertex 0.18-0.25 and at antennal base 0.3-0.36 head width; frontal vitta 1.5-3.0 times wider frontoventrally; 3rd antennomere 1.1-1.3 times longer than 2nd. Parafacial at antennal base 0.18-0.25 and gena 0.23-0.3 eye height; palpus medium-length, apically not essentially inflated; one regular row of postorbital setae, 2nd and 3rd row poorly developed; vte distinct but short; fr 8-11, strong and crossed, one row of parafacial bristles, lower bristles 1.5 times longer than parafacial width; lower part of facial ridge with thin short hairs; ac 0-3+1, propleuron bare; scutellum without or with very fine ap, d absent or very short and fine; ctenidium absent, all femora and hind tibia with fine long and not very dense ventral setae; costal spine long, $R_5$ open, rarely closed, $r_1$ with 4-7 black hairs basally, ratio between 3rd and 5th sections 1 : 0.8-1.1. Abdominal tergite I+II with or without mediomarginals, tergite III with pair of mediomarginals; sternites II and III long setose, sternite IV with short hairs, sternite V with distinct "brush". Segment VII+VIII with 4-6 strong marginals. Cercus moderately curved ventrally, with distinct dorsal inflation at apical 0.3 of length, and with wedge-haped apical process. Pregonite same length as postgonite, pointed; distiphallus medium-length, apical plate very short, anqular, shorter than elongate spoon-shaped lateral arms; ventral process awl-shaped, more or less curved ventrally; stylus medium-length, strongly sigmoid. (Plate XII, Fig. 180).

Body ground coloration very dark, blackish, parafrontal and parafacial grey or silvery grey dusted; frontal vitta, antenna and palpus black, thorax black, with faint grey pollinosity, legs black, wing membrane more or less fumose along veins. Abdomen with deeply dark chequered pattern, genitalia entirely black.

♀. Frons 0.31-0.35 of head width. Mid femoral organ not distinct; VIth abdominal tergite not divided, with row of marginals interruped dorsally.

Body length 3.5-8.0 mm.

**Distribution:** Europe from the British Isles to northern Italy and transpalaearctic to Russian Far East, China (including southern parts) and Japan. A forest species preferring shady humid stands at lower forest elevations. Ecology unknown but probably a snail parasitoid.

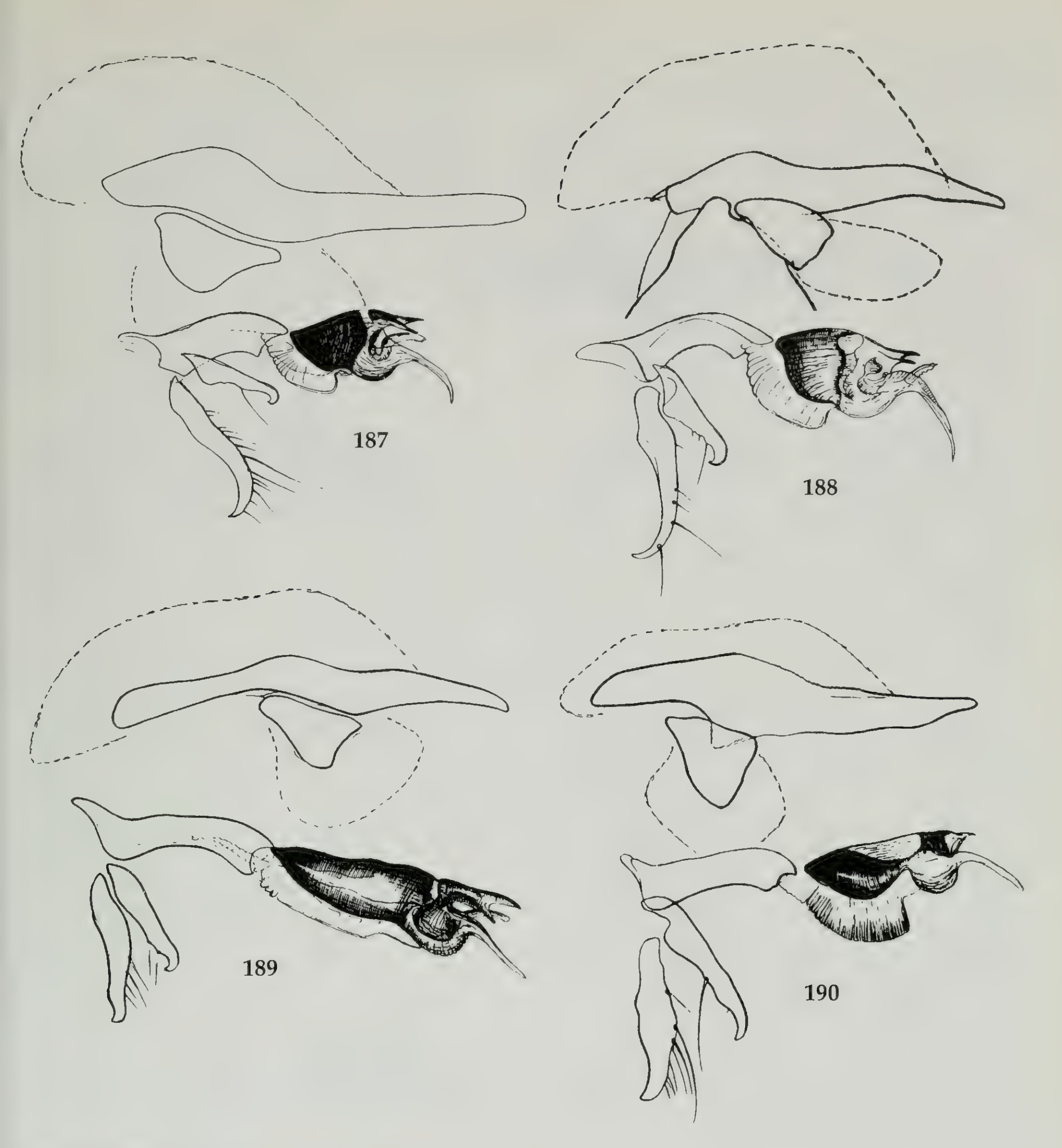
### *Heteronychia* (s. str.) *dissimilis* (Meigen, 1826)

Syst. Beschr. 5: 25 *(Sarcophaga).*

*Heteronychia chaetoneura* Brauer & Bergenstamm, 1889 Denkschr. Akad. Wiss. Wien 56 (1): 56.

**Description**

♂. Frons at narrowest part 0.17-0.21, at vertex 0.19-0.26 and at antennal base 0.3-0.35 head width. Frontal vitta 1.5-2.5 times wider anteroventrally, frons at middle 2-3 times wider than one parafrontal; 3rd antennomere 1.2-1.6 times longer than 2nd. Parafacial at level of antennal base 0.15-0.2 and gena 0.18-0.22 eye height; palpus medium-length, apically moderately inflated. 2-3 rows of postorbitals, vte short but comparatively strong, fr 6-9, strong and crossed, one row of parafacial bristles, lower bristles 1.2-1.5 longer than parafacial width; facial ridge with upper angular vi, and shortly black haired; ac 0+1; propleuron bare. Scutellum without or with very short and delicate ap, d delicate, 1-2 pairs; ctenidium absent, $f_3$ with several fine av, $f_2$, $f_3$ and $t_3$ with fine ventral hairs; costal spine usually strong and long, rarely short; $R_5$ open, sometimes closed, $r_1$ with 4-8 black setae basally, m-angle right, m-cu sigmoid, occasionally nearly straight, ratio between 3rd and 5th costal sections 1 : 0.7-1.1. Abdominal tergite III with pair of long and strong mediomarginals, sternites II and III long setose, sternite IV shortly haired; cercus almost straight, apically narrowed and moderately pointed; pregonite long,




**Figs. 187.-190.** Male genitalia profile of:
**Fig. 187.** *Heteronychia rohdendorfiana* (*nigricauda* Pov. & Slam.)
**Fig. 188.** *Heteronychia dissimilis*
**Fig. 189.** *Heteronychia vicina* (*ebrachiata* auct.)
**Fig. 190.** *Heteronychia porrecta*

curved, apically pointed, dorsal edge with some bristles, postgonite shorter, hook-shaped; distiphallus medium-length; ventral process very long and narrow, bristle-shaped, apical plate medium-length, pointed, with short dentate lateral arms (Fig. 188).

Body colour rather dark; head blackish, only parafrontal and parafacial densely silvery grey dusted. Thorax black with blackish grey pollinosity, mesonotal longitudinal stripes poorly visible; legs black, wing hyaline, considerable parts fumose. Abdomen with dark chequered pattern; genitalia entirely black.

♀. Frons 0.28-0.35 of head width; frontal vitta parallel-sided, 1-1.5 times wider than parafrontal.

Mid femoral organ indistinct. Abdominal tergite VI divided into a pair of lateral plates with long marginal bristles. Genital segments black.

Body length 3.5-7.5 mm.

**Distribution:** Europe to Baltic Sea and Archangelsk, transpalaearctic up to Russian Far East (Primorye). The species accompanies humid lowland forests and shady stands of lower vegetation tiers. It is a snail parasitoid.

### *Heteronychia* (s. str.) *haemorrhoa* (Meigen, 1826)

Syst. Besch. 5: 29 *(Sarcophaga).*

For synonymy see Verves (1986).

#### Description

♂. Frons at narrowest part 0.15-0.21, at vertex 0.17-0.25 and at antennal base 0.25-0.36 head width; frontal vitta 1.5-3 times wider frontoventrally, frons at middle 1.5-3 times wider than parafrontal; 3rd antennomere 1.2-1.8 times longer than 2nd. Parafacial at antennal base 0.2-0.26 and gena 0.2-0.34 eye height. Palpus medium-length, narrow, apically not essentially inflated. 2-3 rows of postorbitals, vte indistinct, fr 7-11, strong and crossed; facial ridge with short hairs at lower 0.3-0.4; one row of facial bristles present, lower bristles same long as parafacial width; ac 0-2+1, propleuron bare; scutellum with crossed and fine ap, one pair of dorsals; ctenidium poorly developed, all femora and $t_3$ with dense ventral hairs, $f_3$ with a row of fine av, $t_3$ with a row of long pv; costal spine medium-length, sometimes indistinct, $r_1$ with 5-10 black setae basally; m-cu sigmoid; ratio between 3rd and 5th costal sections 1 : 0.8-1.1. Abdominal tergite III with pair of strong mediomarginals; segments VII+VIII with 4-6 not very distinct marginals. Cercus profile with distinct dorsal inflation, apical arm almost parallel-sided. Pregonite slightly longer than postgonite, apically curved and more or less pointed; distiphallus elongate, ventral lobes narrow, apically pointed, curved or almost straight. Apical plate elongate and narrow, slightly curved ventrally, as long as (or longer than) spoon-shaped lateral arms (Fig. 183).

Ground coloration deeply grey to blackish; parafrontal and parafacial densely silvery grey or whitish grey dusted, frontal vitta, antenna and palpus black; thorax grey or yellowish grey dusted, longitudinal stripes of mesonotum distinct, blackish; legs black, wings hyaline, basicosta and epaulet yellow. Abdomen with dark chequered pattern; segments VII+VIII black, epandrium red.

♀. Frons 0.26-0.32 of head width. Mid-femoral organ situated distally, reddish, sometimes absent. Abdominal tergite VI complete, symmetrically curved, with row of marginals, interrupted dorsally; genital segments red.

Body length 5-12 mm.

**Distribution:** Europe, and from British Isles to Bashkiria, in north up to southern Norway; an essentially thermophilic species accompanying thin lowland forests and forest margins of lower vegetation tiers. Maggots are parasitoids of helicoid snails (Portschinsky 1894), *Cepaea hortensis* (Mik 1890, Schmitz 1917, Keilin 1919).

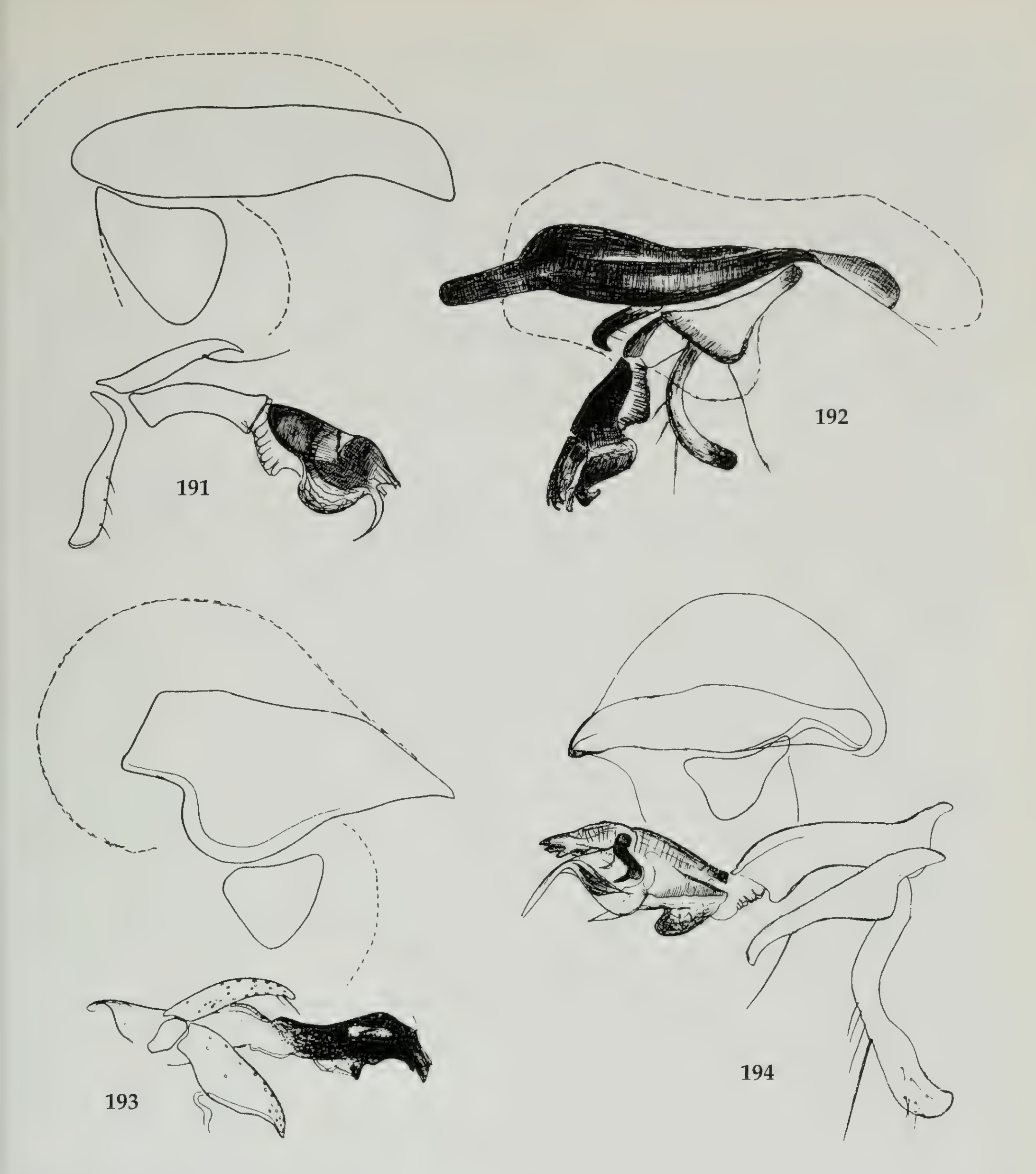
### *Heteronychia* (s. str.) *haemorrhoides* (Böttcher, 1913)

Dt. ent. Z. 3: 245 *(Sarcophaga haemorrhoa* var. *haemorrhoides).*

*Heteronychia wahisi* Lehrer, 1976. Bull. Annls. Soc. r. ent. Belg. 112: 264.

#### Description

♂. Frons at narrowest part 0.17-0.25, at vertex 0.18-0.3 and at antennal base 0.3-0.44 head width; frontal vitta 1.4-2.5 times widening frontoventrally, frons at middle 1.5-3 times wider than one parafrontal; 3rd antennomere 1.2-1.8 times longer than 2nd. Parafacial at antennal base 0.17-0.28 and gena 0.18-0.36 eye height; palpus medium-length, apically poorly inflated; 2-3 rows of postorbitals, vte indistinct; fr 7-11, strong; facial ridge shortly bristled at lower 0.3-0.5, one row of parafacials, lower bristles same long as parafacial width; ac 0-2+1; propleuron bare; scutellum with a pair of short,




**Figs. 191.-194.** Male genitalia profile of:
**Fig. 191.** *Heteronychia schineri*
**Fig. 192.** *Heteronychia pauciseta* (after Mihályi 1979).
**Fig. 193.** *Heteronychia hirticrus*
**Fig. 194.** *Heteronychia vagans*

crossed ap, one pair of d well developed; ctenidium indistinct; all femora and $t_3$ with dense ventral hairs; costal spine medium length, sometimes indistinct, $r_1$ with 4-9 short black bristles basally, ratio between 3rd and 5th costal sections 1 : 0.8-1.5; m-cu sigmoid; abdominal tergite III with pair of strong mediomarginals; segments VII+VIII with 4-6 more or less distinct marginals; genitalia very similar to those of *H. haemorrhoa*, but apical part of cercus narrower and more protruding, sometimes curved ventrally and entire proportions of genitalia more robust, tips of pregonite more acute (Fig. 182).

♀. Not distinguishable from ♀ of *H. haemorrhoea*.
Body length 5.5-12 mm.

**Distribution:** Europe, north to Germany and Poland (but very rare), absent from the British Isles. Asia minor, Transcaucasia, western Siberia (Altaj Mountains) and Iran. This is a highly thermophilic species accompanying both very warm and humid forests (e.g. in Danube basin of Lower Austria, southern Slovakia and Hungary) and rather dry and sunny steppes (e.g. on loess or on limestone). The species is endangered in northern and Central Europe and is becoming more prevalent in southeast Europe. The species is a parasitoid of snails (Verves 1976b, Povolný 1992).

### *Heteronychia* (s. str.) *hirticrus* (Pandellé, 1896)

Revue Ent. 15: 193 *(Sarcophaga)*.

**Description**

♂. Frons at narrowest part 0.2-0.24, at vertex 0.26-0.29 and at antennal base 0.36-0.49 of head width. Frontal vitta 1.5-2 times widening frontoventrally, frons at middle 1.2-2 wider than parafrontal. 3rd antennomere 1.3-2 times longer than 2nd. Parafacial at level of antennal base 0.2-0.25, gena 0.21-0.35 eye height; palpus long and narrow, apically moderately inflated; 2-3 rows of postorbital setae; vte distinct; fr 7-9, strong and crossed, parafrontal with numerous erect hairs, 2-3 rows of parafacial bristles, lower ones not longer than parafacial width; facial ridge at lower 0.2-0.3 with short pilosity; propleuron bare; ac 0-4+1, delicate; scutellum with fine but distinct ap and one pair d. Ctenidium absent; $f_1$ with a row of pv distinct only in distal 0.3-0.5; all femora with long and dense ventral hairs; $t_3$ with numerous hairy pv and v; $R_5$ open, $r_1$ bare, m-vein right- or acutely-angled, m-cu sigmoid; ratio between 3rd and 5th costal sections 1 : 0.5-0.8. Abdominal tergite III without mediomarginals; sternite II long pillose, sternites III and IV with medium-length hairs; segment VII+VIII without marginals, with long dense pillosity, epandrium with numerous long hairs; cercus short with broad basis, strongly narrowing apically, almost straight and pointed. Pregonite broad with hook-shaped apical appendix, postgonites sligthly curved, almost straight, same length as pregonite; membranal lobe well sclerotized, erect stick-like; distiphallus elongate, strongly sclerotized, apical plate long and narrow, bristle-like, without lateral arms; stylus elongate, moderately widening, apically pointed, ventral apophyses short, hook-shaped, pointed (Fig. 193). Ground coloration dark grey; head black, only parafrontal and parafacial densely silvery grey or yellowish grey dusted; thorax grey dusted, mesonotal longitudinal stripes black and distinct; legs black, wings hyaline, basicosta and epaulet yellow. Abdominal pattern dark grey chequered, genitalia lustrous black (Plate X, Fig. 193).

♀. Frons 0.3-0.36 of head width, mid-femoral organ well developed, distinctly red, situated at distal 0.5; abdominal tergite VI complete, with strong marginals forming a somewhat irregular row, and with numerous hairs, black.
Body length 5.5-13 mm.

**Distribution:** Europe including the British Isles, eastwards to northern Caucasus and reaching southern Sweden in the north; north Africa and Transcaucasia. Flies are strongly heliophilic accompanying sunlit habitats and hilltops, especially at lower elevations, with decreasing densities towards mountain ranges. Larvae are parasitoids of *Helix aspersa* Müll. (Barfoot 1969, Beaver 1972) and flies were reared from dead swallows and from snails.

### *Heteronychia* (s. str.) *infixa* (Böttcher, 1913)

Dt. ent. Z. 2: 124 *(Sarcophaga)*.

**Description**

♂. Frons at narrowest part 0.19-0.21, at vertex 0.23-0.25 and at antennal base 0.31-0.34 head width. Frontal vitta 2 times widening frontoventrally, frons middle 2 times wider than parafrontal. 3rd antennomere 1.5-1.7 times longer than 2nd. Parafacial at antennal base 0.17-0.18 and gena 0.18-0.2 eye height. Palpus long, apex inflated. 2-3 rows of postorbitals, vte indistinct, fr 6-7, strong and crossed,

one row of parafacials, longest of them not longer than parafacial width; facial ridge with 4-5 short black bristles at lower 0.2-0.3; ac 0-2+1, delicate; propleuron bare; scutellum with comparatively long ap and one pair d; ctenidium absent, $f_2$ and $f_3$ with thin ventral hairs; all tibiae without hairs; $R_5$ narrowly opening, sometimes closed, costal spine long and strong, $r_1$ with 3-5 black hairs in basal part, m-angle right, m-cu almost straight, ratio between costal section 3 and 5 as 1 : 1. Abdominal tergite III without mediomarginals, sternites II and III with long erect hairs, sternite IV with short setae. Segment VII+VIII with marginals, cercus moderately curved ventrally, with well developed preapical dorsal inflation, and with narrow apical arm; pregonites very long, curved, apically pointed, with some dorsal bristles, postgonites short, hook-shaped. Membrane with distinct inflation, ventral apophyses short, almost straight, pointed, stylus long, narrow, distinctly sigmoid, apex not widened, apical plate same long as paraphallus, medium-broad, apex narrowed, but not pointed, its lateral arms medium-length, distinctly shorter than apical plate, parallel-sided (Fig. 199) Ground coloration dark grey; head densely silver dusted, frontal vitta, antenna and palpus black; thorax black, dark grey dusted, longitudinal mesonotal stripes distinct; legs black, wings hyaline, basicosta and epaulet yellow; abdominal pattern dark grey chequered Segments VII+VIII lustrous black, epandrium red (Fig. 199).

Body length 4.5-6.5 mm.

♀ unknown.

**Distribution:** Southern Bavaria, Austria, southern Moravia, Hungary. Ecology not known. A very rare and little known taxon.

### *Heteronychia* (s. str.) *lednicensis* Povolný, 1986

Acta Univ. Agric. Brno, ser. C 53: 115. (in: Povolný & Verves, 1986)

#### Description

♂. Frons at narrowest part 0.2, at vertex 0.25 and at antennal base 0.35 head width; frontal vitta 2.5 wider than parafrontal. 3rd antennomere 1.8 times longer than 2nd. Parafacial at antennal base 0.25 and gena 0.33 eye height; palpus elongate, apically inflated; 2 rows of postorbitals, vte well developed, fr 9-10, strong, one row of parafacials, medium-length, facial ridge with short hairs at lower ⅓. Scutellum without ap, with one pair of d; ctenidium well developed; $R_5$ open, costal spine strong, $r_1$ bare, m-angle right, m-cu sigmoid, ratio between costal section 3 and 5 as 1 : 0.8. Abdominal tergite III, without mediomarginals. Cercus short and tall, apex pointed and distinctly curved ventrally, with short spine ventral bristles; gonites and sedeagus rather similar to *H. proxima*, but apical plate not so high (Fig. 185).

Body ground coloration grey; head densely silvery white dusted; frontal vitta, antenna and palpus black. Thorax black, grey dusted, longitudinal mesothoracic bands distinct; legs black, wings hyaline, basicosta and epaulet yellowish white; abdominal pattern pale grey chequered. Segments VII + VIII black lustrous, epandrium red.

Body length 9 mm.

♀ unknown.

**Distribution:** The unique ♂ type specimen comes from Lednice, South Moravia, where it was collected in a humid warm lowland forest.

### *Heteronychia* (s. str.) *pauciseta* (Pandellé, 1896)

Revue Ent. 15: 182 *(Sarcophaga)*.

#### Description

♂. Frons at narrowest part 0.12-0.14, at vertex 0.16-0.19 and at antennal base 0.31-0.36 head width; frontal vitta 2-3 times widening frontoventrally, frons middle 2-3 times wider than parafrontale. 3rd antennomere 1.1-1.5 and gena 0.15-0.24 eye height; palpus long, apex moderately inflated; one row of postorbitals, vte indistinct, fr 9-12, long and crossed, one row of parafacial bristles, lower ones as long

as parafacial width; facial ridge with medium-length black hairs at lower 0.3-0.4; propleuron bare, ac 0+1. Scutellum with ap well developed and crossed, one pair of d; ctenidium well developed, $f_1$ with numerous elongate pa and p; $t_1$ with 2-3 ad, $t_3$ with 2 long and 3-4 short ad near middle, all femora with long and thin vetral setae. Costal spine sbort, distinct. $R_5$ open, $r_1$ bare, m-angle right, m-cu sigmoid, sometimes nearly straight; ratio between 3rd and 5th costal sections 1 : 0.6-0.9. Abdominal tergite III with one pair of strong mediomarginals, sternites II and III long setose, sternite IV with short hairs, sternite V with a short "brush", and with numerous long hind bristles. Segments VII+VIII with 6-8 strong marginals. Cercus broad, almost straight, with a narrow stick-like apical apophyse showing rounded tip, and with longitudinal lateral furrow; pregonite long and almost straight, apically curved and inflated, with 3-5 long dorsal bristles; postgonite short and broad, hook-shaped, with 1-2 long ventral bristles; membrane not widening, ventral apophysis medium-length, hook-formed, stylus long and narrow, distinctly curved, apical plate short with numerous short spines and with short dentate lateral arms (Fig. 192). Body ground coloration dark grey, head densely silvery dusted, frontal vitta, antenna and palpus black; mesonotum with broad black longitudinal stripes, thorax grey dusted, legs black, wings hyaline, basicosta and epaulet yellow; abdomen with blackish grey chequered pattern; segment VII+VIII black lustrous, epandrium lustrous red (Fig. 192).

Body length 7.5-12 mm.

♀ unknown.

**Distribution:** Balkan countries (Croatia, Bosnia, Herzegovina, Greece), Bulgaria, Germany, Poland, Estonia, Ukraine and Russia (Kaliningrad, Moscow, St. Petersbourgh, Bashkiria, western Siberia). A forest species accompanying mesophytic formations. Its presence in central Europe is not clearly evidenced and the species is obviously rare.

## *Heteronychia* (s. str.) *porrecta* (Böttcher, 1913)

Dt. ent. Z. 4: 361.

*Heteronychia bulgariensis* Lehrer, 1977. Acta zool. bulg. 3: 29.

### Description

♂. Frons at narrowest part 0.25-0.27, at vertex 0.34-0.37 and at antennal base 0.38-0.4 head width. Frontal vitta 1.5 times widening frontoventrally, frons middle 1.5-2.5 times wider than parafrontal; 3rd antennomere 1.3-1.5 longer than 2nd, parafacial at antennal base 0.32-0.36 and gena 0.3-0.33 eye height; palpus long; one row of postorbitals, vte indistinct, fr 8-10, very strong and long, 1-2 rows of parafacial bristles, longest ones shorter than parafacial width; propleuron bare, ac 2-3+1, dc 3-4+3, strong (Fig. 162). Scutellum with distinct ap and d. Ctenidium absent, all femora and hind tibia with long and dense ventral setae. Costal spine medium-length, $R_5$ open, $r_1$ bare; m-angle sharp, m-cu distinctly sigmoid, ratio betwen costal section 3 and 5 as 1 : 0.7-0.8; abdominal tergite III without medial marginals, sternites II and III with long erect hairs, sternite IV short setose; segments VII+VIII with 6-8 strong marginals; cercus long and straight or with ventral edge moderately convergent towards tip, which is either moderately tipped or obtuse. Pregonite and postgonite of nearly same length, pregonite distinctly sigmoid, apically pointed and with several dorsal setae, postgonite rather straight, apically distinctly hook-shaped, with 1-2 ventral bristles. Distiphallus elongate, ventral lobes big, with long, narrow, rather straight bristle-like apophyses, apical plate very short, with short lateral spines (Fig. 190).

Body ground coloration grey, head densely silvery dusted, frontal vitta black or brownish, antenna and palpus black. Legs black, wings hyaline, basicosta and epaulet yellow; abdomen with chequered pattern well developed; genitalia lustrous, segment VII+VIII black, epandrium red, sometimes with blackish ventral part or margin.

♀ undescribed.

Body length 10-14 mm.

**Distribution:** This is a purely alpine (montane) species accompanying thin alpine forests exclusively on limestone near the timberline. Males display their courtship mostly in thin shadow of shrubs and (coniferous) trees, or they are elevated by air currents on limestone cliffs. The species occurs in the

Alps, Carpathians (Malá and Velká Fatra Mountains in Slovakia, Romanian Carpathians), Balkans (e.g. Croatian Alps, Vichren Mountains, Macedonian Pindos-Mountains, Olympos Mountains).

### *Heteronychia* (s. str.) *proxima* (Rondani, 1860)

Atti Soc. ital. Sci. nat. 3: 392

**Description**

♂. Frons at narrowest part 0.16-0.19, at vertex 0.19-0.24 and at antennal base 0.33-0.38 head width. Frontal vitta 1.5-2.5 times widening frontventrally; frons middle 2-3 times wider than parafrontal; 3rd antennomere 1.2-1.6 times longer than 2nd; parafacial at antennal base 0.24-0.4 and gena 0.2-0.26 eye height. Palpus medium-length, apex poorly inflated; 2-3 rows of postorbitals, vte medium-length, fr 8-13, strong, one row of parafacials, longest ones distinctly longer than parafacial width; facial ridge at lower 0.2-0.3 with short black setae; ac 0-3+1, propleuron bare; scutellum with crossed ap and with 1-2 pairs of d; ctenidium indistinct, $f_2$ with a row of av in proximal 0.5-0.6, $f_3$ with a row of both av and pv, all f with ventral hairs, $t_3$ with long pv-bristles; $R_5$ open, $r_1$ bare, costal spine medium-length, m-angle 90° or obtuse, m-cu sigmoid or almost straight, ratio between 3rd and 5th costal sections 1:0.9-1.2. Abdominal tergite III usually without mediomarginals, but in some instances with their indications; sternites I-IV with long erect setae. Segment VII+VIII with 8-12 marginal bristles; cercus with 8-12 marginals; cercus profile broad, moderately curved ventrally, apex moderately pointed, without dorsal inflation. Pregonite and postgonite of equal length, pregonite almost straight, broad, slightly narrowing towards obtuse apex, with numerous dorsal chaetae; postgonite straight, apex strongly curved hook-shaped and pointed, with 1-2 ventral bristles. Distiphallus elongate, membrane well sclerotized, slightly widened, ventral apophysis short, sigmoid, apex pointed, apical plate medium-length, almost straight, apically pointed, short lateral spines well developed; stylus narrow, medium-length, sigmoid (Fig. 184). Body ground coloration dark grey; parafrontal and parafacial densely yellowish white or silvery white dusted, frontal vitta, antenna and palpus black; thorax grey dusted; longitudinal mesonotal bands well developed; legs black, wings hyaline, along veins slightly yellowish or greyish, basicosta and epaulet yellow. Abdomen with pattern distinctly dark chequered; segment VII+VIII lustrous black with broad, more or less distinct rounded posterior spot of greyish pollinosity (Fig. 184).

♀. Frons 0.3-0.35 of head width; mid femoral organ very small and blackish, sometimes indistinct; abdominal tergite VI reddish, complete, moderately membraneous dorsally, with a row of marginals, interrupted dorsally.

Body length 6.5-11 mm.

**Distribution:** Europe to Sweden and Finland, (absent from the British Isles); western Siberia and northwestern China. Flies prefer mesophytic habitats with thin vegetation of forest or shrub character. It is a parasitoid of snails (*Euomphalia strigella* – Povolný & Groschaft 1959); *Agriopis aurantaria* (Kiev Region, leg. Rafalsky, det. J. Verves). The species avoids elevations above 800 m in central Europe.

### *Heteronychia* (s. str.) *rohdendorfi* (Povolný & Slamečková, 1959)

Acta ent. Mus. natn. Pragae 33: 427 *(Pierretia)*.

**Description**

♂. Frons at narrowest part 0.14-0.22, at vertex 0.2-0.27 and at antennal base 0.34-0.38 head width; frontal vitta 1.5 times widening frontoventrally, frons middle 2.5-3 times wider than parafrontal; 3rd antennomere 1.2-1.4 times longer than 2nd. Parafacial at level of antennal base 0.14-0.16 and gena 0.22-0.25 eye height. Palpus medium-length with apex distinctly inflated; one row of postorbitals, vte short but well developed; fr 7-9, strong and long, crossed, parafaciale with one row of bristles, lower ones longer than parafacial width; facial ridge at lower 0.2-0.3 with several blackish, short hairs; propleuron bare; ac 2-3+1, distinct; scutellum with one pair of ap and one pair of d; ctenidium indistinct, all femora with thin medium length pillosity on ventral surface; $t_3$ with a row of hairy av and

pv. $R_5$ open, sometimes closed, $r_1$ basally with 5-7 short bristles, costal spine medium-length, strong; m-angle right, m-cu distinctly sigmoid, ratio between 3rd and 5th costal sections 1 : 1.1; abdominal tergite III with pair of very strong, long mediomarginals, sternites II and III setose, sternite IV with short hairs; segment VII+VIII with 4-8 strong marginals; cercus broad, more or less curved ventrally, apically narrowing and nearly pointed, with preapical dorsal inflation; pregonite very long, narrow, apically pointed, slightly curved with numerous dorsal hairs, postgonites shorter, hook-shaped, pointed, with 1-2 dorsal bristles; membrane slightly widening, distiphallus protruding, apically pointed; apical plate short, straight, apically pointed, shorter than its lateral srms which are spatulate and projecting; stylus medium-broad, apically dilating, almost straight, strongly protruding over apical plate (Fig. 178). Body ground coloration dark, parafrontal and parafacial silvery white dusted, frontal vitta, antenna and gena velvety black. Thorax black, grey dusted, longitudinal mesonotal stripes well developed and broad; legs black, wings glassy transparent, base moderately fumose, basicosta and epaulet yellow; abdomen with dark chequared pattern, nearly without pollinosity. Genitalia bright reddish (Fig. 178).

♀ unknown.

Body length 6.5-10.5 mm.

**Distribution:** Switzerland, Austria, Bohemia, Moravia, Slovakia, Poland, Ukraine, Rumania and Greece. The species accompanies dry habitats, primarily on limestone and loess, and occurs both in lowlands (rather rare) and mountains (up to 1.800 m – Alps, Carpathians, Balkans) where it is sometimes locally common (e.g. slopes of Olympos in Greece). Adults fly from June to early September, and might be confused with males of *Heteronychia boettcheriana*.

### *Heteronychia* (s. str.) *rohdendorfiana* Mihályi, 1975

Acta zool. hung. 21: 106.

*Pierretia nigricauda* Povolný & Slamečková, 1959. Acta. ent. Mus. natn. Pragae 33: 431 (nom. preocc.).
*Heteronychia nigricaudata* Povolný & Slamečková, 1982. Annot. zool.-bot. Bratislava 150: 1.

**Description**

♂. Frons at narrowest part 0.16-0.2, at vertex 0.19-0.25 and at antennal base 0.3-0.42 head width. Frontal vitta 1.5-3 times widening frontoventrally, frons middle 2-3.5 times wider than parafrontal; 3rd antennomere 1.2-1.6 times longer than 2nd. Parafacial at level of antennal base 0.18-0.23 and gena 0.21-0.24 of eye height; palpus medium-length, apex moderately inflated; 1-2 rows of postorbital setae, vte long, fr 6-11, strong and crossed, parafacial with one row of bristles, 2-3 lower bristles longer than parafacial width, facial ridge at lower 0.2-0.3 with several short, black setae (Fig. 161). Propleuron bare; ac 0-2+1, delicate; scutellum with long and crossed ap, and with one pair d; ctenidium absent, all femora with numerous long pv and 4-6 strong pv. $R_5$ open, $r_1$ with 4-8 black setae in basal half, costal spine usually long and strong, sometimes (in small specimens) short and indistinct, m-cu distinctly curved or nearly straight, m-angle right or obtuse, ratio between 3rd and 5th costal sections 1 : 0.8-1.5; abdominal tergite III with pair of strong mediomarginals, sternites II and III long setose, sternite IV with short hairs, segment VII+VIII with 4-6 strong marginals; cercus profile with inflated bases, otherwise very long, parallel-sided digitate with obtusely rounded tip; pregonite elongate, narrow, curved, apically pointed, postgonite shorter, hook-shaped, with 1-2 ventral bristles; membrane only moderately protruding; distiphallus elongate, moderately thick; ventral apophysis very long and narrow, almost straight, apically pointed; apical plate short, pointed, lateral arms as long as apical plate, claw-shaped; stylus narrow, medium-length, nearly straight (Fig. 187). Body ground coloration dark grey; parafrontal and parafacial including lunula densely silvery dusted; frontal vitta, antenna and palpus black; thorax blackish, grey dusted, longitudinal mesonotal bands distinct; legs black, wings hyaline, moderately fuscous at base and along veins, basicosta and epaulet yellow; Abdominal pattern dark checkering, genitalia entirely black and lustrous (Fig. 187).

♀. Frons at narrowest part 0.28-0.33 head width; frontal vitta almost parallel-sided, frons middle same wide as parafrontal; scutellum without ap, or ap very delicate, hairy; mid-femoral organ absent; abdominal tergite VI complete, with numerous long marginals, black.

Body length 3.5-14 mm.

**Distribution:** Switzerland, southern Germany, Hungary, Czechia, Slovakia, southern Poland and Ukraine (especially Carpathian district). Bred from the snails *Arianta arbustorum*, *Brachybaena fruticum*, *Monachoides incarnata* (Povolný 1982). This is an overlooked forest species, obviously confused with *Heteronychia dissimilis* and misidentified. It shows a considerable variation of size, small specimens 3.5-6 mm, rather similar to *H. dissimilis*, live in forests of lower elevation vegetation tiers, whereas big individuals reaching up to 14 mm in body length occur in shady montane forests.

### *Heteronychia* (s. str.) *rondaniana* (Rohdendorf, 1937)

Fauna SSSR 19: 361 *(Pierretia)*.

*Sarcophaga arvorum* sensu Rondani, 1860. Atti Soc. ital. Sci. nat. 3: 381 (nec Meigen, 1826).
*Sarcophaga depressifrons* auctorum (nec Zetterstedt, 1845).

**Description**

♂. Frons at narrowest part 0.18-0.19, at vertex 0.23-0.24 and at antennal base 0.37-0.39 head width; frontal vitta 1.4-2.2 times widening frontoventrally, frons at middle 2-3.5 times wider than parafrontal; 3rd antennomere 1.1-1.5 times longer than 2nd; parafacial at level of antennal base 0.17-0.2 and gena 0.17-0.21 eye height. Palpus medium-length, apical inflation slight, 1-2 rows of postorbitals vte indistinct fr 8-9, strong and crossed; parafacial with 1-2 rows of setae, lower ones longer than parafacial width; facial ridge setose at lower 0.3; propleuron bare, ac 2-3+1, comparatively strong; scutellum with medium length and crossed ap and with one pair of fine d; ctenidium absent, all femora with short ventral setae, $t_3$ with a row of hairy av in distal half; $r_1$ bare, $R_5$ open, costal spine medium-length, m-angle right, m-cu almost straight, ratio between 3rd and 5th costal sections 1 : 1-1.1. Abdominal tergite III without mediomarginals, sternites II and III with long hairs, sternite IV shortly setose, segments VII+VIII with 6-10 long marginals; cercus profile medium-wide, almost straight, apex strongly curved ventrally and pointed; pregonite long and narrow, centrally curved, apex broad, several dorsal setae; postgonite same long, straight, tip strongly curved, hook-shaped and pointed, usually with one ventral bristle; membrane slightly widened; distiphallus elongate and narrow, ventral process short hook-formed; apical plate elongate and broad, apex pointed, with small hook-formed lateral arms; stylus medium-length, not protruding, curved (Fig. 176). Body ground coloration dark grey, parafrontal, parafacial and lunula greyish white dusted, other head parts blackish, grey dusted, longitudinal mesonotal stripes well developed; legs black, wings hyaline, along veins moderately fuscous, basicosta and epaulet yellow; abdominal pattern dark chequered; genitalia black lustrous (Fig. 176).

♀ unknown.

Body length 5-10 mm.

**Distribution:** Germany, Czechia, Slovakia, Austria, Hungary, Rumania, Spain, France, Italy, Croatia, Bulgaria and Greece. The species is usually rare, accompanying humid lowland forests.

### *Heteronychia* (s. str.) *schineri* (Bezzi, 1891)

Bull. Soc. ent. Ital. 23: 67 *(Sarcophaga)*.

**Description**

♂. Frons at narrowest part 0.14-0.17, at vertex 0.18-0.21 and at antennal base 0.31-0.42 head width; frontal vitta 2-3.5 times widening frontoventrally, frons middle 1.5-3 times wider than one parafrontal; 3rd antennomere 1.4-1.8 times longer than 2nd; parafacial at level of antennal base 0.16-0.19 and gena 0.23-0.26 eye height; palpus medium length, apex poorly inflated; one row of postorbitals, vte indistinct, fr 7-12, not very strong, crossed, parafacial with 2-3 irregular rows of setae, longest ones shorter than parafacial width, facial ridge at lower 0.3-0.4 with numerous short black hairs; propleuron bare; ac 0-3+1, short and indistinct; scutellum with fine ap and one pair of d bristles; ctenidium indistinct, all femora with medium-length ventral setae, $t_3$ with a row of hairy pv; $R_5$ open, $r_1$ bare, costal spine medium-length, sometimes very short or indistinct; m-vein right-angled, m-cu more or less

sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.8; abdominal tergite III with pair of strong erect mediomarginals; sternite II with long erect hairs, sternites III and IV short setose. Segments VII+VIII with several hairy marginals; cercus profile broad and curved ventrally at moderately pointed apex; pregonite long with dilated apex and provided with numerous dorsal setae; postgonite distinctly shorter, straight, apically hook-shaped and pointed, with 1-2 ventral bristles; membrane distally inflated; distiphallus short and tall, ventral apophysis elongate, narrow and almost straight, apical plate short and narrow, lateral processes spiny, stylus narrow and medium-length, not protruding (Fig. 191). Body ground coloration dark grey. Parafrontal, parafacial and lunula densely silvery dusted, frontal vitta, antenna and palpus black; thorax blackish, grey dusted, longitudinal stripes on mesonotum very broad and distinct; legs black, wings hyaline, membrane slightly fumose along veins; basicosta and epaulet yellow; abdominal pattern dark chequered. Segments VII+VIII black lustrous, epandrium orange reddish (Fig. 191).

♀. Frons at narrowest part 0.29-0.31 of head width; mid-femoral organ distinct, orange red, situated distally at 0.3-0.4 of femoral length; abdominal tergite VI complete, elongate, distinctly protruding, with numerous discal hairs and with row of strong marginals, interrupted dorsally.

Body length 9.5-14 mm.

**Distribution:** Ranging from French Alps eastwards to Ukraine, Balkan countries, northern Caucasus, Georgia, Armenia, Azerbaijan. Occurs in central Europe in Czechia, Slovakia, Austria and Hungary. The species is associated with both dry lowland forests (e.g. on sands or loess) and mountain ranges, at elevations up to 2.500 m (Alps, Balkan), especially in limestone districts.

### *Heteronychia* (s. str.) *slovaca* Povolný & Slamečková, 1967

Acta ent. bohemoslovaca 64: 314.

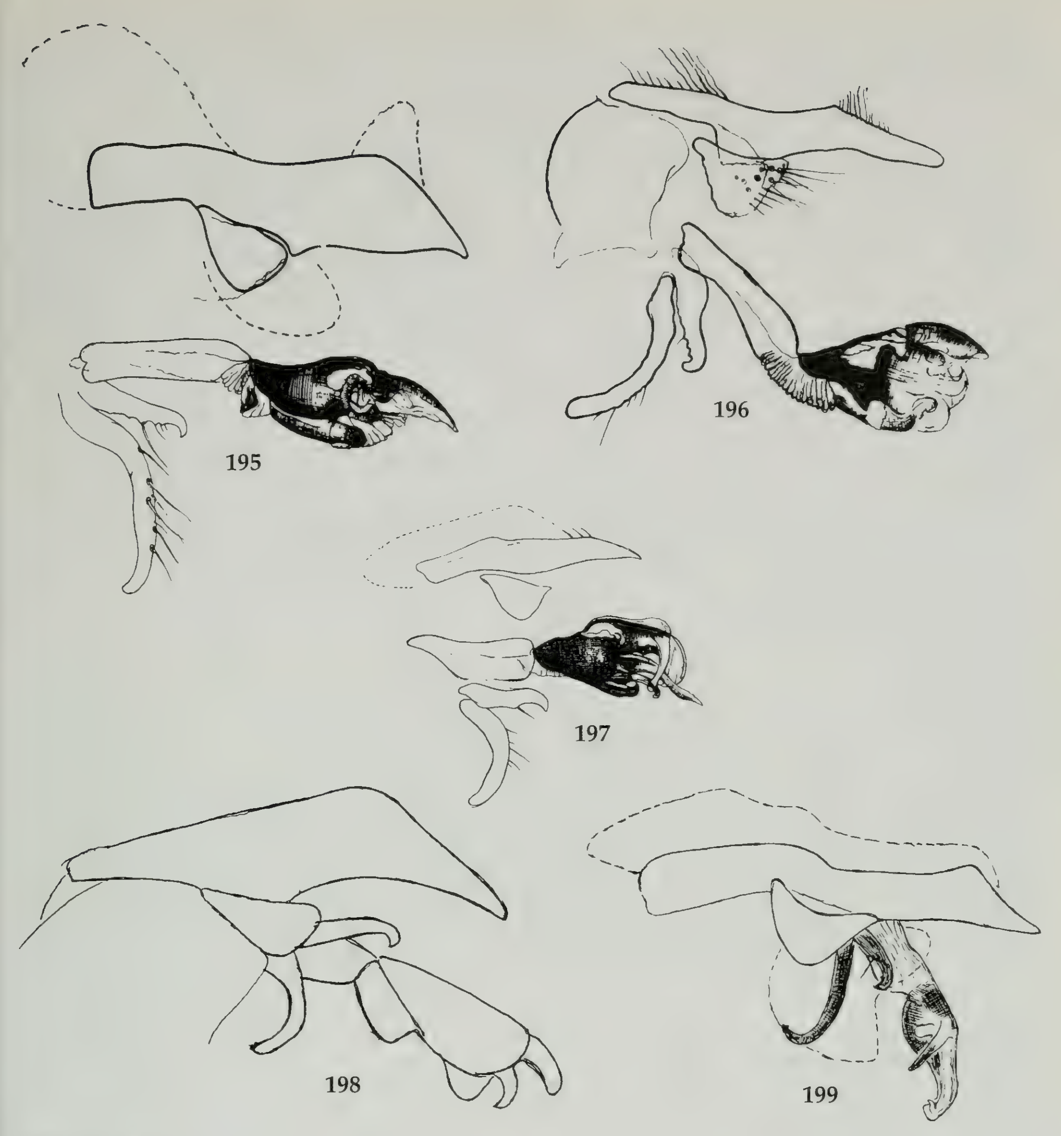
**Description**

♂. Frons at narrowest part 0.16-0.19, at vertex 0.17-0.22 and at antennal base 0.35-0.41 head width. Frontal vitta 1.5-3 times widening frontoventrally, frons middle 2-3 times wider than parafrontal; 3rd antennomere 1.4-2 times longer than 2nd; parafacial at antennal base 0.23-0.3 and gena 0.26-0.33 eye height. Palpus medium length, apically poorly inflated; one row of postorbitals, vte distinct, fr 8-11, strong and crossed, parafacial setae one row, the longest greater than parafacial width, facial ridge with black setae at lower 0.3; ac 0+1, delicate; propleuron bare; scutellum with ap crossed and with one pair of d; ctenidium indistinct, all femora and $t_{2-3}$ with numerous medium-length ventral setae; $R_5$ open, $r_1$ with 5-6 black setae basally, costal spine medium-length; m-angle straight, m-cu distinctly sigmoid; ratio between 3rd and 5th costal sections 1 : 0.7-0.8; abdominal tergites II and III with strong erect pair of mediomarginals; sternites II and III with long erect hairs, sternite IV shortly setose; segment VII+VIII with row of marginals; cercus profile with distinct dorsal inflation, moderately curved ventrally, apically pointed; pregonite elongate and narrow, apically not widening and pointed, with several dorsal setae; postgonite distinctly shorter, apically hook-shaped, with 2 bristles ventrally; membrane almost without inflation; distiphallus elongate and slender, ventral apophysis long and nearly straight, apical part narrow and pointed, apical plate elongate and narrow, more or less sigmoid and apically pointed, as long as spoon-shaped lateral arms; stylus long, apically distinctly widening and protruding (Fig. 179). Body ground coloration dark grey; parafrontal, parafacial and lunula densely silvery grey dusted; frontal vitta, antenna and palpus black; thorax blackish, grey dusted with mesonotal longitudinal stripes distinct; legs black, wings hyaline, epaulet and basicosta yellowish; abdomen with pattern dark chequared; segment VII+VIII black lustrous, epandrium both blackish or red (Fig. 179).

♀. Frons at narrowest part 0.45 of head width, frontal vitta almost parallel-sided, 2 times wider than parafrontal; mid-femoral organ indistinct, blackish; abdominal tergite VI complete, with numerous marginals, black or reddish.

Body length 5-10 mm.

**Distribution:** Probably Carpathian and east European endemic inhabiting limestone formations of Eastern Slovakia Carpathians and Ukrainian Carpathians, and Central Ukraine (Kiev district). Flies frequent humid mountain forests and may descend to lower forest limits.




**Figs. 195.-199.** Male genitalia profile of:
**Fig. 195.** *Heteronychia filia*
**Fig. 196.** *Heteronychia taurica*
**Fig. 197.** *Heteronychia minor* (*fertoni* auct.)
**Fig. 198.** *Heteronychia thalhammeri*
**Fig. 199.** *Heteronychia infixa.* (after Böttcher 1913).

### *Heteronychia* (s. str.) *thalhammeri* (Böttcher, 1913)

Dt. Ent. Z. 3: 253 *(Sarcophaga).*

#### Description

♂. Frons at narrowest part 0.15-0.7, at vertex 0.18-0.2 and at antennal base 0.31-0.35 head width. Frontal vitta 2 times widening frontoventrally; frons middle 2 times wider than parafacial. 3rd antennomere 1.2-1.4 times longer than 2nd. Parafacial at antennal base 0.18-0.19 and gena 0.19-0.2 eye

height. Palpus medium-length, apex without inflation. 1-2 rows of postorbitals, vte indistinct, fr 6-8, strong and crossed. One row of parafacials, longest ones longer than parafacial width, facial ridge at lower 0.3 setose. Propleuron bare, ac 2-3+1, short; scutellum with a pair of crossed ap and a pair of d. All femora with thin ventral hairs, $t_3$ with several thick av and pv; $R_5$ open, $r_1$ bare, costal spine well developed; m-vein right angled, m-cu almost straight, ratio between 3rd and 5th costal section as 1 : 0.8-1.1; abdominal tergite III with a strong pair of mediomarginals, sternites II and III with long erect hairs, sternite IV with short setae; segments VII+VIII with several marginals; cercus broad, almost straight, apex strongly curved ventrally and pointed. Pregonite elongate, curved, apex rounded, not widened, several dorsal setae; postgonite same long as pregonite, almost straight, apically hook-formed and pointed, with 2 dorsal bristles; membrane with distinct ventral inflation; paraphallus elongate, ventral processes short hook-shaped; apical plate elongate and narrow, apically rounded, without lateral arms; stylus medium-length, not protruding (Fig. 198). Body ground coloration as in *H. rondaniana*.

♀ unknown.

Body length 4.5-6 mm.

**Distribution:** Hungary, Bulgaria. – This taxon is not satisfactorily cleared.

### *Heteronychia* (s. str.) *vagans* (Meigen, 1826)

Syst. Beschr. 5: 26 *(Sarcophaga)*.

*Sarcophaga frenata* Pandellé, 1896. Revue Ent. 15: 182.

**Description**

♂. Frons at narrowest part 0.19-0.21, at vertex 0.21-0.24 and at antennal base 0.33-0.37 head width; frontal vitta 1.5-2.5 times wider frontoventrally, frons middle 2-3.5 times wider than parafrontal; 3rd antennomere 1.5-1.8 times longer than 2nd; parafacial at antennal base 0.16-0.22 and gena 0.21-0.3 times wider than eye-height. Palpus medium-length, slightly inflated apically; 1-3 rows of postorbitals, vte short but distinct, fr 7-10, medium length and crossed, 1-2 rows of parafacials, longest ones longer than parafacial width; facial ridge at lower 0.4-0.5 densely but short setose; propleuron bare; ac 0+1, short, scutellum with ap crossed, and with 1-2 pairs of discals; ctenidium indictinct, all femora with numerous and long ventral hairs, hind femur with complete row of strong av, hind tibia with a row of hairy elongate av and pv; $R_5$ open, $r_1$ bare, or with 1-4 basal bristles, costal spine well developed, m-vein right angled, m-cu both sigmoid or more or lass straight, ratio between 3rd and 5th costal sections 1 : 0.7-1; abdominal tergite III with pair of strong mediomarginals, sternite II and III with long erect hairs, sternite IV short setose, segment VII+VIII with 4-8 medium-length marginals; cercus apically moderately curved ventrally, with indistinct dorsal inflation and with slight apical indentation; pregonites elongate, strongly curved ventrally, apically more or less dilated and rounded, with numerous dorsal setae, postgonite distinctly shorter than pregonite, straight, apically hook-formed and pointed, with 1-2 ventral bristles; membrane distinctly inflated, distiphallus comparatively short and widened, ventral process shortly hook-shaped, apical plate short and narrow, with very short spinose lateral processes, stylus narrow, medium-length, not protruding (Fig. 194). Body ground coloration dark grey, parafrontal, parafacial and lunula densely silvery grey dusted, frontal vitta, antenna and palpus black, thorax blackish, grey dusted with distinct mesonotal longitudinal stripes, legs black, wings hyaline, basicosta and epaulet yellow; abdominal pattern dark chequered. Segments VII+VIII lustrous black, epandrium red (Fig. 194).

♀. Frons at narrowest part 0.29-0.33 head width. Mid-femoral organ situated distally, reddish or brown, sometimes little distinct; tergite VI divided into pair of distinct lateral plates, each with a row of strong marginals and hairy bristles forming nearly a doubled marginal row, terminalia red.

Body length 5.5-12 mm.

**Distribution:** Transpalaearctic from British Isles to Japan, in the North up to northern Norway and Sweden, and in Jakutia. Absent from North Africa and Central Asia. The species accompanies thin forests and bushy habitats and is mostly common at lower elevetions. Larvae are parasitoids of snails of the families Succineidae (Verves 1976b) and Helicidae (*Eulota maacki* Gerstf. – Artamonov 1985).

It seems that this species is absent from southern Italy, Sardinia and southern Spain and that its (shrub) niches are occupied by *Heteronychia pandellei* (Rohdendorf, 1937) and possibly also by *Heteronychia siciliana* (Enderlein, 1928).

### *Heteronychia* (s. str.) *vicina* (Macquart, 1835)

Hist. Nat. Ins., Dipt. 2: 225 *(Sarcophaga).*

*Sarcophaga ebrachiata* Pandellé, 1896. Revue Ent. 15: 182.

**Description**

♂. Frons at narrowest part 0.16-0.24, at vertex 0.21-0.27 and at antennal base 0.35-0.38 head width. Frontal vitta 1.5-1.7 times widening frontoventrally, frons middle 1.7-2.8 times wider than parafrontal; 3rd antennomere 1.2-1.5 times longer than 2nd; parafacial at antennal base 0.19-0.28 and gena 0.19-0.3 eye height; palpus medium-length, not essentially inflated apically; 3 rows of postorbitals, vte absent, fr 7-9, medium-length, crossed; Parafacial with 1-2 rows of bristles, longer ones shorter than parafacial width; facial ridge with several black setae at lowest 0.2-0.3; propleuron bare, ac 0-3+1, short; scutellum with crossed ap, and 1-2 pairs of discals; ctenidium absent; all femora, $t_2$ and $t_3$ with numerous long ventral hairs, $f_2$ with a row of av at proximal 0.5-0.6, and with an apical row of strong pv, $f_3$ without av except for subapicals; $R_5$ open, $r_1$ bare, costal spine medium-length, m-vein right-angled, m-cu distinctly sigmoid, ratio between 3rd and 5th costal sections 1 : 0.7-1. Abdominal tergite III usually without mediomarginals which are rarely present, sternites II and III with long hairs, sternite IV shortly setose; segment VII+VIII with numerous long marginals; cercus profile almost straight and gradually tapering, dorsal edge moderately excised; pregonite sigmoid, apically pointed, with numerous dorsal hairs, postgonite same long as pregonite, straight, apically hook-formed and pointed, usually with one subapical bristle ventrally; distiphallus rather elongate, membrane not inflated; plate medium-length, pointed apically, with pair of very short lateral spines; stylus elongate, moderately protruding and strongly sigmoid (Fig. 189). Body ground coloration dark grey, parafrontal, parafacial and lunula densely silvery dusted; frontal vitta, antenna and palpus black; thorax blackish with grey pollinosity, blackish longitudinal stripes on mesonotum distinct; legs black, wings hyaline, slightly fumose basally, basicosta and epaulet yellow, squama white; abdominal pattern distinctly blackish chequered; segment VII+VIII black or brownish black lustrous, epandrium bright red or with brownish tinge (Fig. 189).

♀. Narrowest frontal width 0.31-0.34 of head width; mid femoral organ situated at 0.2-0.3 of femoral length, distinct and mostly bright red, occasionally with brownish or blackish tinge; abdominal tergite VI complete, but poorly sclerotized dorsally, with long and strong marginals laterally.

Body length 7-11.5 mm.

**Distribution:** European Alps, Carpathians and Balkan mountain ranges, also Scandinavia (Norway, Sweden, Finland), Ukraine (near Chernovtsi), northern Caucasus and Abkhazia. The species shows essentially a boreomontane disjunction and distribution. There exist, however, extrazonal (demontane) populations in limestone habitats outside high mountain ranges at considerably lower elevations, e.g. Bohemian Karst in Central Bohemia, and limestone formations of Thuringia, where the species occurs at low elevations around 450 m a.s.l. The species accompanies mostly limestone formations, being nearly absent from granites etc. In alpine lime-stone habitats populations can reach high densities. Larvae parasitize snails.

### Subgenus *Pandelleola* Rohdendorf, 1937

Fauna SSSR 19: 328.

**Type species:** *Sarcophaga filia* Rondani, 1860.

Thorax with 3 post dc, ac 0 (in rare instances 1-2) +0-1, all very delicate; $r_1$ either haired or bare; abdominal segments VII+VIII with marginals; ctenidium absent; $R_5$ open, rarely closed; ventral plate of distiphallus without processes (arms); apical plate elongate, without lateral arms. 8 species in West Palaearctic region, and one in central Europe.

## *Heteronychia (Pandelleola) filia* (Rondani, 1860)

Atti Soc. ital. Sci. nat. 3: 385 *(Sarcophaga)*.

**Description**

♂. Frons at narrowest part 0.21-0.24, at vertex 0.27-0.29 and at antennal base 0.37-0.4 head width; frontal vitta 1.5-1.7 times widening frontoventrally; frons middle 1.5-2 × wider than parafrontal; 3rd antennomere 1.2-1.5 times longer than 2nd. Parafacial at antennal base 0.2-0.24 and gena 0.27-0.33 eye height. Palpus long, apically not inflated; 3 rows of postorbitals, vte well developed; fr 6-8, strong and crossed; parafacial with row of bristles, longest ones as long as parafacial width; facial ridge haired at lower 0.2-0.3; propleuron bare; ac 0-2+1, very short; scutellum with crossed ap and with one pair of d-bristles; ctenidium absent, all femora with long and dense ventral hairs, $f_3$ without av, $t_3$ with a row of hairy elongate av and pv; $R_5$ open, $r_1$ bare, costal spine medium-length, m-vein right angled, m-cu sigmoid, ratio between 3rd and 5th costal sections 1 : 1-1.2. Abdominal tergite III with strong medi-omarginals; sternites II and III with long hairs, sternite IV short setose, segment VII+VIII with 4-6 strong marginals; cercus profile rather broad and short, almost straight, apically pointed; pregonite elongate, curved, apically pointed, postgonite short, apically hook-shaped, with 1-2 ventral bristles; membrane moderately inflated; distiphallus medium-length and broad (tall); apical plate elongate and narrow, apically pointed, curved ventrally, without lateral arms; stylus shortened and not protruding (Fig. 195). Body ground coloration pale grey; orbits, parafacial and lunula silvery greyish or yellowish dusted, frontal vitta, antenna and palpus black; thorax densely grey dusted; longitudinal mesonotal stripes distinct, black. Legs black, wings hyaline, basicosta and epaulet yellow, squama white; abdominal pattern bright chequered, segment VII+VIII black lustrous, epandrium red, sometimes with brownish hue, rarely black (Fig. 195).

♀. Frons at narrowest part 0.31-0.33 of head width; frontal vitta parallel-sided, 1-1.4 times wider than parafrontal; mid-femoral organ absent; abdominal tergite VI separated into two lateral plates provided with long marginals. Terminalia reddish, rarely black.

**Distribution:** Europe except Scandinavia, eastwards to Russia (Voronezh district) and northern Caucasus. The species shows dependency to dry habitats, especially forest steppes, preferring lime-stone and loess formations and it is visibly endangered and disappearing from European north and west to south and east representing obviously Mediterranean element.

## Subgenus *Ctenodasypygia* Enderlein, 1928

Arch. klassif. phylogen. Ent. 1: 40.
**Type species:** *Sarcophaga fertoni* Villeneuve, 1911.

*Bercaea* Rohdendorf 1937. Fauna SSSR 19, 1: 322 (nec Robineau-Desvoidy, 1863).
**Type species:** *Sarcophaga penicillata* Villeneuve, 1907.

*Mediterranisca* Rohdendorf, 1965. Ent. Obozr. 44: 684.
**Type-species:** *Sarcophaga penicillata* Villeneuve, 1907.

*Leclercquiomyia* Lehrer, 1976. Bull. Annls. Soc. r. ent. Belg. 112: 195.
**Type species:** *L. thirionae* Lehrer 1976.

*Benedenia* Lehrer, 1970, ibid.: 200.
**Type species:** *L. mousteti* Lehrer (syn. of *Sarcophaga fertoni* Villeneuve, 1911).

**References:** Verves 1993, Fliegen palaearkt. Reg. 11 (311): 502-504 (unfinished).

Grey flies of different size (3-12 mm). Postorbital setae 2-3 regular rows, parafacial and gena mid-wide, parafacials short or mid-long, not longer than parafacial width; ctenidium more or less distinct, $r_1$-vein bare or haired basally. Apical plate elongate and broad with complete lateral arms. Segment VII+VIII with well developed 6-10 marginal bristles. 8 thermophilic species are distributed in Mediterranean region, one present in central Europe. Some species, e.g. *H. penicillata* (Villn.) and *H. siciliensis* (Bött.) are parasites of terrestrial gastropods (Povolný 1992).

### *Heteronychia (Ctenodasypygia) minima* (Rondani, 1862)

Dipt. ital. prodr. 5: 113 (*Sarcophaga fertoni* auct. nec *Sarcophaga fertoni* Villeneuve, 1911).

*Pierretia (Bercaea) graeca* Rohendorf, 1937. Fauna SSSR 19, 1: 327.

**Description**

♂. Frons at narrowest part 0.18-0.2, at vertex 0.25-0.28 at antennal base 0.34-0.36 of head width; frontal vitta 2-3 times wider frontoventrally, frons middle 1.5-2.5 times wider than parafrontal; 3rd antennomere 1.3-1.6 longer than 2nd. Parafacial at antennal base 0.17-0.22, gena 0.22-0.3 of eye height. Palpus mid-long, moderately wider apically; 2 rows of postorbital setae, vte absent, fr 5-8, not very strong, facial ridge at lower 0.3 shortly bristled, parafacial setae one vertical row. ac 2-3+1. Propleuron bare. Scutellum with fine long setae; ctenidium well developed, $f_2$ and $f_3$ with several ventral setae, all tibiae without hairs. $R_5$ open or closed at wing margin, $r_1$ bare, costal spine long and strong, ratio between 3rd and 5th section as 1 : 1.2-1.4; 3rd abdominal tergite without mediomarginals. Cercus short and broad, apically pointed, medially distinctly excised and with a slight preapical tubercle dorsally. Apical plate wide, apically pointed, with obtuse, ventrally curved wall, distinctly clavate lateral arms directed ventrally (Fig. 197).

Body colour dark; 3rd antennomere black or pale brown, palpus black; longitudinal stripes on mesonotum poorly developed; epandrium red or black.

♀. Frons vertex 0.3-0.4 of head width. Frontal vitta parallel-sided, 0.5-0.8 times wider than parafrontal. vte strong. Mid-fermoral organ absent. 6th abdominal tergite complete, with long marginals, reddish or black.

Body length 3-9 mm.

**Distribution:** France, Italy, Hungary, Moravia, Greece, Israel, Egypt. Flies prefer dry sunlit habitats, partly on forest margins. Ecology unknown. A rare species.

## Subtribe Phallanthina Rohdendorf, 1965

Ent. Obozr. 44 (3): 677.

*Bellieriina* Rohdendorf, 1965. Ent. Obozr. 44 (3): 677 (pro parte).
*Pierretiina* Verves, 1987, Ent. Obozr. 66 (3): 665.

Frons in ♂ narrower than eye, in ♀s as wide as eye. 3rd antennomere usually not more than 2 times longer than 2nd. Parafacial setose or haired. Parafrontal and gena moderately wide. Postsutural dc 3, occasionally 4 (paired), of equal length; propleuron usually bare, sometimes haired. $R_5$ usually open, $r_1$ bare or setose, apical plate, membranal and ventral arms of aedeagus well developed and complete. ♀ with abdominal tergites VII and VIII more or less reduced. Abdomen usually with well developed chequered pattern. Body length from 3-14 mm.

Larvae (maggots) schizophagous, sometimes parasitoids or predators of snails, arthropods, less usually in vertebrate tissues. This tribe comprises 23 genera and more than 160 species distributed in all zoogeographical regions; 7 genera in central Europe.

## Genus *Arachnidomyia* Townsend, 1934

Revue Ent. 4: 111.

**Type species:** *Sarcophaga davidsoni* Coquillett, 1892.

Dark, medium-sized flies. Parafacial short or medium length. Occiput and postgena black-haired with only few white hairs surrounding occipital foramen. Membranal lobes of aedeagus rounded, covered by numerous spines, ventral arms shortened and connected with paraphallus, apical plate short and wide, without lateral arms, stylus medium-length, widened, with preapical spine. ♀ with abdominal tergites VII-X absent. 1st segment of 1st instar larva with numerous strong spines. Larvae are predators on egg-cocoons of spiders. 16 species occur in the Holarctic and Neotropical regions. One species in central Europe.

## *Arachnidomyia sexpunctata* (Fabricius, 1794)

Ent. Syst. 4: 300 *(Musca).*

*Sarcophaga clathrata* Meigen, 1826, Syst. Beschr. 5: 25. Syst. Beschr. 5: 25.

**Description**

♂. Frons at narrowest part 0.7-0.21, at vertex 0.21-0.25 and at antennal base 0.35-0.39 head width. Frontal vitta 1.5-2 times wider frontoventrally, frons middle 2.5-4 times wider than parafrontal. 3rd antennomere 1.3-2 times longer than 2nd. Parafacial of antennal base 0.18-0.3 and gena 0.18-0.26 eye height. Palpus slender. One row of postocular setae regular, other rows irregular; vte indistinct; fr 9-13, 3-4 fore pairs divergent, crossed; one row of parafacials, lowest of them longer than parafacial width; facial ridge at lowest 0.3-0.5 with black hairs; propleuron bare, ac 4-5+1, dc 2-4+3-4, strong. Scutellum with one pair of crossed ap and one pair d. Ctenidium consists of medium-length bristles, all femora with several elongate ventral hairs, $f_2$ with numerous long and strong av and pv. $t_3$ with long pv and av. Abdominal tergite III with pair of strong mediomarginal bristles, sternites II-IV with long erect hairs; sternite V without "brush", covered by medium-length hair-like setae. Segment VII+VIII shortened, with few fine marginal hairs. Cercus straight, dorsal margin evenly convex, apex with medium-sized hook. Pregonite elongate, more or less curved, apically widened, dorsally haired; postgonite shorter, hook-shaped, with 1-2 ventral bristles. Membranal lobes well sclerotized, protruding, covered with numerous small spines. Distiphallus shortened but tall, apical plate wide and short, with two apical spines, ventral plates united with paraphallus, hook-shaped. Stylus with short apical indentation (Fig. 206).

Body ground colour dark. Head black, parafrontal, parafacial and gena with silvery or golden pruinosity, antenna, frontal vitta and palpus black. Thorax grey or golden grey dusted, longitudinal mesonotal stripes black, borders indistinct. Legs black, wings hyaline, slightly fuscous along veins, basicosta brownish or yellowish, epaulet black or brownish black, Abdomen black with golden or silvery grey chequered pattern, genital segments lustrous black.

♀. Narrowest part of frons 0.28-0.33 head width; frontal vitta parallel-sided, 1.5-2 times wider than parafrontal; vte well developed; scutellum without ap. Femora without long ventral hairs. Mid femoral organ absent. Abdominal tergite VI divided dorsally, each of lobes with 6-10 marginals of medium length. Genitalia black.

Body length 5.5-12 mm.

**Distribution:** A holarctic species found mostly at lower elevations, especially in humid warm lowground forests, and undisturbed habitats on forest margins up to foothills of mountains. Flies feed at flowers of Asteraceae, Euphorbiaceae etc. Bred from spider egg cocoons: *Araneus cornutus* Clerk and *Clubiona* spp. (Mik 1890, Grunin 1964). The species is endangered.

## Genus *Ascelotella* Enderlein, 1928

Arch. Klassif. Phylog. Ent. 1 (1): 50.
**Type species:** *Ascelotella formosana* Enderlein, 1928 (syn. of *Sarcophaga calicifera* Böttcher, 1912).

Dark, small or medium-sized flies. Parafacial narrow, gena medium tall; $r_1$ haired, ctenidium on ♂ mid femora absent. propleuron bare. ♂ with abdominal tergite II and III with long and erect hairs. Apical plate of distiphallus with well developed lateral arms, ventral arms distinctly separated from paraphallus. ♀ with abdominal tergite VI divided into two lateral lobes. Tergite VII absent or small, paired and membranous tergites VIII-X absent.

3 subgenera and 6 species distributed in Palaearctic, Oriental and Afrotropical regions, one species in central Europe. Larvae schizophagous, facultative parasitoids and predators of snails, arthropods etc.

## Subgenus *Mimarhopocnemis* Rohdendorf, 1937

Fauna SSSR 19 (1): 166.
**Type species:** *Sarcophaga granulata* Kramer, 1908.

Lower 3-4 pairs of parafacials distinctly longer than parafacial width; 3rd antennomere 1.5-2 times longer than 2nd. $R_5$ open. Abdominal tergite III with pair of strong mediomarginals. ♂ postabdominal tergite VII+VIII with fine marginals, cercus with dorsal protuberance covered by numerous short spines; ventral arms poorly sclerotized, short and bilobate; 2 pairs of mebranal srms. One European species.

### *Ascelotella (Mimarhopocnemis) granulata* (Kramer, 1908)

Ent. Wbl. 153 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.22-0.25, at vertex 0.26-0.29 and at antennal base 0.36-0.4 head width. Frontal vitta almost parallel-sided, frons middle 1.5-2.6 times wider than parafrontal. 3rd antennomere 1.6-2 times longer than 2nd. Parafacial at level of 3rd antennomere 1.6-2.0 times longer than 2nd. Parafacial at antennal base 0.16-0.19 and gena 0.18-0.23 eye height. Palpus long, apically widened. One or two rows of postorbitals, vte well developed, fr 7-9, strong and crossed; vibrissal ridge with several black setae at lower 0.2-0.3; ac 0+0-1, very fine; dc 2+3, strong. Scutellum with one pair of crossed ap and one pair of d. All femora with several short ventral hairs, $f_2$ with 3-7 strong av, $t_3$ with 2-3 long and 2-4 short av. $R_5$ open, $r_1$ in basal 0.3-0.5 haired, costal spine medium-length, m-vein right-angled, m-cu more or less sigmoid, ratio between 3rd and 5th costal sections 1 : 1.2-1.5. Abdominal sternite V with short, poorly developed "brush" and medium-length hind bristles. Cercus profile broad and short, distinctly curved ventrally, apically abrupt-narrowed and pointed, with distinct preapical protuberance covered by short striking spines. Pregonite medium-length and narrow, apex obruse, sigmoid, with several dorsal hairs; postgonite shorter, hook-shaped, with 2-3 bristles ventrally. Membranal arms paired, strongly sclerotized and protruding, distiphallus medium-length and tall, ventral apophysis short and narrow, apically bilobate; apical plate narrow and apically pointed, with a pair of widened lateral arms, stylus medium-length, almost straight, not very protruding (Fig. 207).

Body ground coloration dark. Head black, only parafrontal, parafacial, gena and lunula densely yellowish white dusted. Thorax black, grey dusted, longitudinal mesonotal stripes well developed, black; legs black, wings hyaline, moderately fuscous at base, basicosta and epaulet yellow, squama white. Abdominal pattern silvery grey and dark chequered. Genitalia lustrous black.

♀. Frons at narrowest part 0.3-0.34 head width, frontal vitta almost as wide as parafrontale. Scutellum without ap. Mid-femoral organ very distinct, big and situated in middle of femur, reddish brown to brownish black. Abdominal tergite VI divided centrally, each of lateral lobes with 10-13 strong marginals; tergite VII membranous, bare, very narrow, ring-shaped, indistinctly interrupted centrally. Genitalia black.

Body length 4-9 mm.

**Distribution:** France eastwards to Ukraine and European Russia, Italy, Balkan Peninsula (Bulgaria, Romania, Serbia). The species is locally common in atlanto-mediterranean part of Europe with decreasing population densities towards eastern Europe. It accompanies especially undisturbed humid and warm lowland forests along major European rivers. Larval feeding is unknown.

## Genus *Bellieriomima* Rohdendorf, 1937

Fauna SSSR 19 (1): 164 (subgenus of *Thyrsocnema*).
**Type species:** *Sarcophaga laciniata* Pandellé, 1896 (syn. of *Sarcophaga subulata* Pandellé, 1896).

Grey, medium-sized to big flesh-flies. Parafacial bristles comparatively short. 3, sometimes 4 pairs of postsutural dc-bristles, prescutellar ac well developed, ventromedial part of hind trochanter in ♂ with long setae; propleuron bare. Abdominal strernites II-IV with long erect hairs in ♂. $r_1$ bare, $R_5$ open. Apical plate of distiphallus elongate, broad, centrally interrupted and forming, together with elongate paired membranal process, a nipper; ventral lobes elongate, distinctly separated from distiphallus, styli long and narrow, bristle-like.

Mid-femoral organ absent in ♀; ♀ with abdominal tergite VI interrupted centrally, marginal bristles well developed, remaining postabdominal tergites absent or reduced, small, membranous and bare. 17 species distributed mostly in eastern Palaearctic, in Oriental region and in Solomon Islands [e.g. *Bellieriomima simplex* (Lopes), comb. n.] Larvae are necrophagous. One European species.

### *Bellieriomima subulata* (Pandellé, 1896)

Revue Ent. 15: 194 *(Sarcophaga)*.

*Sarcophaga laciniata* Pandellé, 1896: Revue Ent. 15: 195:

#### Description

♂. Frons at narrowest part 0.18-0.22, at vertex 0.24-0.26 and at antennal base 0.32-0.35 head width. Frontal vitta 1.3-2 times wider frontoventrally, frons at middle 1.5-2.5 times wider than one parafrontal. 3rd antennomere 1.8-2.2 times longer than 2nd. Parafacial at antennal base 0.19-0.22 and gena 0.2-0.29 eye height; vte indistinct; fr 8-10, strong and crossed. One row of parafacial bristles, lower 3-4 pairs same long or moderately longer than parafacial width; vibrissal ridge at lower 0.3-0.4 with numerous black hairs. Postgena and occiput with numerous white hairs. Propleuron bare; ac 0+1, very fine; dc 2-3+3, strong. Scutellar ap crossed, one pair of d. Ctenidium distinct consisting of short thin bristles; all femora and hind tibia with numerous long ventral hairs; $f_2$ with a complete row of av and pv, pv proximally more delicate. $R_5$ open, $r_1$ bare, m right-angled or acute, m-cu more or less distinctly sigmoid; ratio between 3rd and 5th costal sections as 1 : 0.7-0.8, costal spine small but well developed. Abdominal segment III with or without a weak pair of mediomarginals. Sternite V with well developed short "brush" and long distal bristles. Genitalia robust; segments VII+VIII square with strong marginal bristles, cercus claw-shaped; pregonite mid-length, almost straight, apically rounded with several dorsal bristles; postgonite nearly same long as pregonite, broad, hook-shaped, with 1-2 ventral bristles; membranal process trilobate, central lobe claw-shaped, strongly sclerotited, lateral lobes elongate, narrow, apically protruding, moderately sclerotized; ventral process midlong, weakly sclerotized, ligulate; apical plate very tall, apically obtuse, poorly sclerotized; stylus elongate and narrow, medial process of interior parts of distiphallus well developed (Fig. 208).

Body ground coloration comparatively dark. Frontal vitta, antenna and palpus black or brownish black, other head-parts densely yellowish white pollinose. Thorax black, grey dusted, longitudinal mesonotal stripes distinct, legs black, wings hyaline, basicosta and epaulet yellow, squama white. Abdomen with usual grey chequered pattern. Genitalia black, segment VII+VIII densely grey pollinose, epandrium lustrous.

♀. Frons at narrowest part 0.27-0.3 of head width, frontal vitta nearly same broad as parafrontal, scutellum without ap. Mid-femoral organ absent, abdominal tergite VI divided into a pair of lateral plates, each with numerous long and strong marginals, black or brownish black.

Body length 5-12 mm.

**Distribution:** Europe (north to southern Sweden and Karelia), western Siberia, Georgia. The species accompanies mesophytic sunlit forest margins at lower elevations, rarely ascending to higher elevations. Flies have been bred from pupae of *Lymantria dispar* (L) (Girfanova 1957, Herting & Simmonds 1976).

## Genus *Krameromyia* Verves, 1982

Ent. Obozr. 61 (1): 189 (nom. nov. pro *Kramerella* sensu Rohdendorf, 1937).
**Type species:** *Sarcophaga anaces* Walker, 1849.

*Kramerella* Rohdendorf, 1937 (nec Enderlein, 1928).

Grey, medium-sized flies. 3rd antennomere not more than twice as long as 2nd. Parafacial moderately Wide with a row of bristles, longest of them 2-3 times longer than parafacial width; propleuron bare; ac 0+1, postsutural dc 3 pairs. Ctenidium absent, $f_3$ with a row of strong av. $R_5$ open, $r_1$ haired, 3rd and 5th costal sections equal length; ♂ postabdomen medium-sized, segments VII+VIII square without marginals. Cercus broad and short, almost straight, apically hooklet-shaped, haired, but without spines; pregonite medial part broadening, otherwise almost straight; membranal process unpaired, elongate, mace-shaped; distiphallus short and tall, rounded; ventral process fused with strongly sclerotized paraphallus and widening so that it surrounds distiphallus dorsally and laterally; stylus long and narrow; apical plate bilobate, awl-shaped, without lateral arms. Abdominal tergite VI in ♀ bilobate, tergites VII-X reduced; sternite VIII narrow, membranous and bare. Abdomen with dark chequered pattern, genitalia black. One holarctic species.

### *Krameromyia anaces* (Walker, 1849)

Dipt. Brit. Mus. 4: 833 *(Sarcophaga).*

*Sarcophaga setipennis* Rondani, 1860. Atti Soc. Ital. Sci. Nat. 3: 389.

**Description**

♂. Frons at narrowest part 0.28-0.3, at vertex 0.31-0.44 and at antennal base 0.34-0.38 head width. Frontal vitta nearly parallel-sided, frons middle 1.5-2.5 times broader than parafrontal; 3rd antennomere 1.5-2 times longer than 2nd. Parafacial at antennal base and gena 0.2-0.22 eye height. Palpus medium-length, apically moderately widening; 2-3 rows of postorbital setae; vte long and strong; ocellar bristles long; fr 6-9, strong and crossed; facial ridge at lower 0.2-0.3 with several black setae; postgena and occiput with black and white haires. Scutellum with long crossed ap and one pair of d. Ctenidium absent; all femora with thin and long ventral hairs; $t_1$ with a row of strong av. $r_1$ with a row of bristles and interrupted at level of subcostal vein curve; m-cu vein distinctly sigmoid, ratio between 3rd and 5th costal sections 1 : 1-1.2. Abdominal tergite III with pair of strong mediomarginals. Sternites II-IV with long erect hairs. Sternite V with distinct "brush" and medium-long hind bristles. Genitalia in Fig. 209.

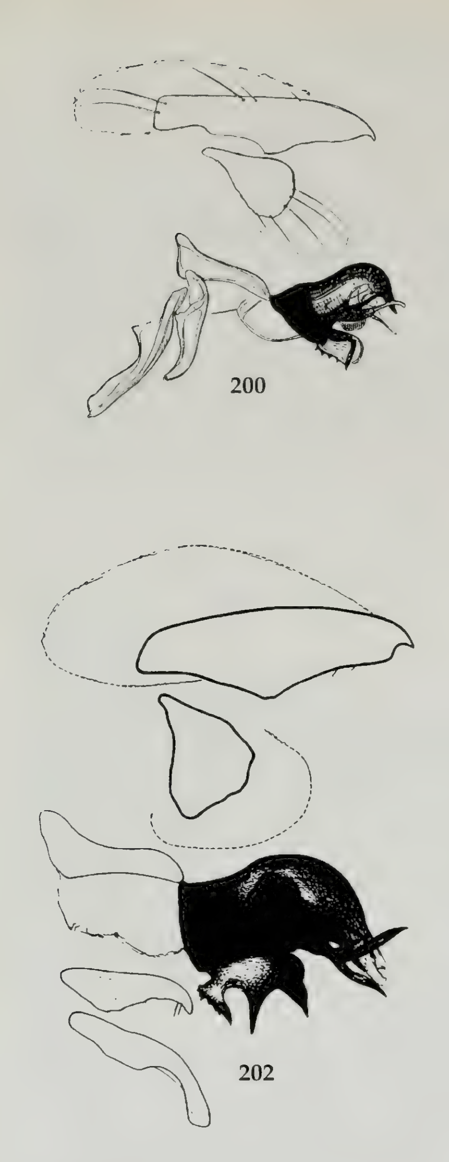
Body ground coloration dark; head silvery grey or grey dusted, frontal vitta, antenna and palpus black or greyish black. Thorax grey dusted, longitudinal mesonotal stripes distinct; legs black, wings hyaline, moderately fuscous at base and along costal margin.

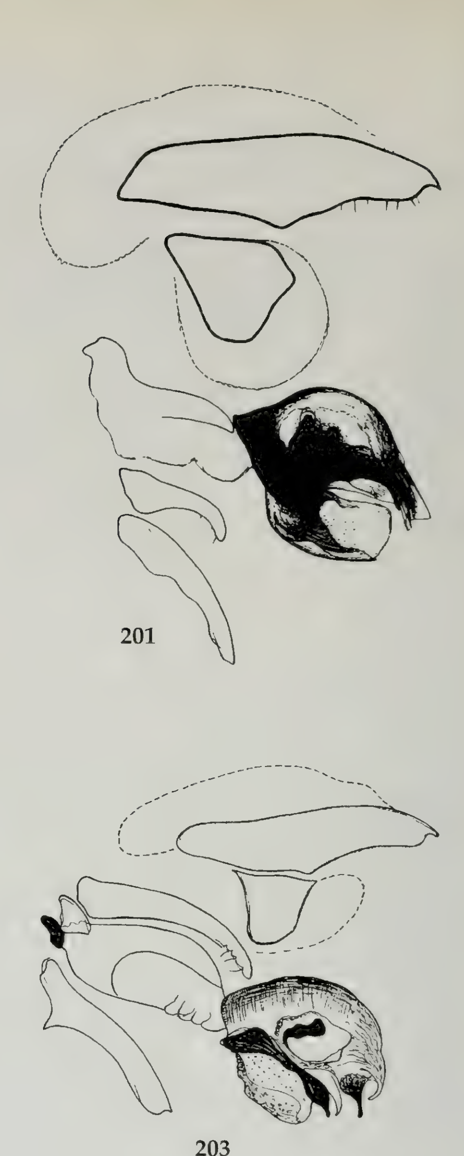
♀. Frons at narrowest part 0.37-0.4 head width, frontal vitta as wide as parafrontal. Mid femoral organ absent. Abdominal tegite VI dorsally interrupted with medium-length marginals.

Body length 4-8.5 mm.

**Distribution:** Holarctic, occurring in the Neartic region (detailed data lacking), and is widely distributed in Europe, but absent from Scandinavia and with decreasing densities in the North; also known from Algeria.

The species frequents open sunlit, dry and warm habitats on sand, loess and generally poor soils, avoiding higher elevations and dense vegetation of shrubs and trees. It has been bred from snails *Helix (Cochlicella) acuta* Mill. (Böttcher 1912) and *Helix nemoralis* (Richet 1990).



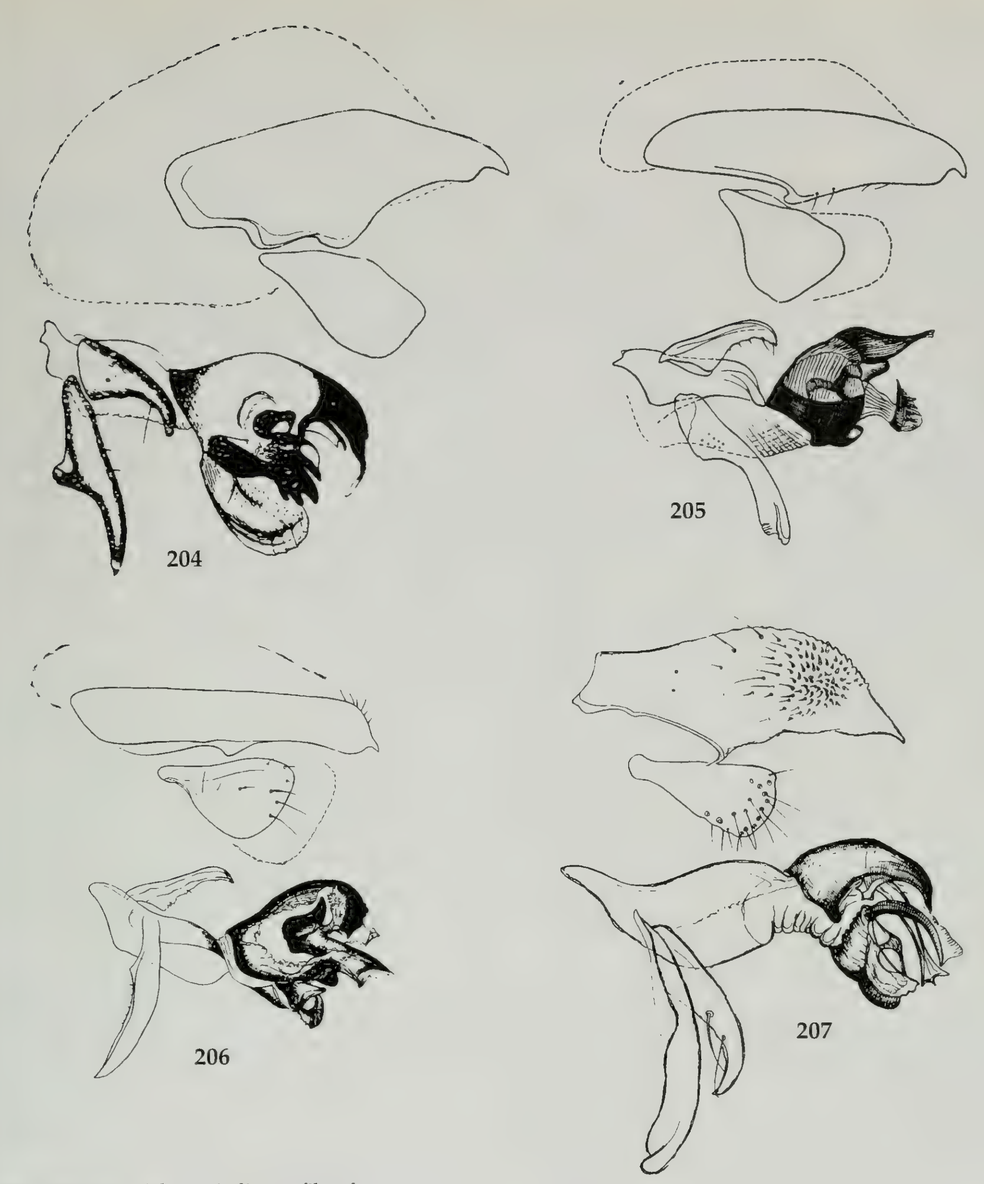


Figs. **200.-203.** Male genitalia profile of:
**Fig. 200.** *Pierretia nemoralis*
**Fig. 201.** *Pierretia discifera*
**Fig. 202.** *Pierretia lunigera*
**Fig. 203.** *Pierretia nigriventris*

## Genus *Pandelleana* Rohdendorf, 1937

Fauna SSSR 19 (1): 189.
**Type species:** *Sarcophaga protuberans* Pandellé, 1896.

3rd antennomere about 2 times longer than 2nd. Parafacial profile very broad, frons protruding, oral margin not protruding and lower head margin distinctly narrower than head length at level of antennal base. Propleuron bare. 3-4 pairs of strong postsutural dc; $r_1$ bare, $R_5$ open. ♂ postabdomen medium-sized. ♂ abdominal tergite VII+VIII nearly square, without strong marginals. Pregonite




**Figs. 204.-207.** Male genitalia profile of:
**Fig. 204.** *Pierretia soror*
**Fig. 205.** *Pierretia villeneuvei*
**Fig. 206.** *Arachnidomyia sexpunctata*
**Fig. 207.** *Ascelotella granulata*

elongate, and narrow. Membranal lobe large, protruding, wellsclerotized, consisting of 2 lateral arms and medial part, spinose. Medial process of interior distiphallus long and broad, protruding; stylus long and narrow, protruding. ♀ abdominal tergite VI divided into a pair of lateral lobes, each provided with numerous long marginals, sternite VIII very short, membranous, with several setae. 4 species: *P. protuberans* in western Palaearctic, *P. shantungensis* Yeh, 1964 and *P. struthioides* Xue, Feng & Li, 1986 in China and *P. sabiensis* (Zumpt 1953) in South Africa (Transvaal and Cape Province). Larval feeding not known, but possibly snail parasitoids.

## *Pandelleana protuberans* (Pandellé, 1896)

Revue Ent. 15: 187 *(Sarcophaga).*

*Pandelleana kaszabi* Mihályi, 1975. Acta Zool. Hung. 21 (1-2): 101.

**Description**

♂. Frons at narrowest part 0.2-0.23 at vertex 0.24-0.27 and at antennal base 0.38-0.42 head width. Frontal vitta 1.2-2 × widening frontoventrally, frons middle 2-3.5 times wider than one parafrontal; 3rd antennomere 1.2-1.7 times longer than 2nd. Parafacial at antennal base 0.27-0.32 and gena 0.25-0.38 eye height. Palpus moderately long, apically moderately inflated. One row of postorbitals; vte absent; fr 9-16, medium-length, crossed; parafrontal with numerous erect hairs; parafacial with numerous hairs and hairy bristles forming occasionally 3-5 irregular vertical rows, longest of them not exceeding parafacial width; postgena and occiput whitish hairy. Facial ridge at lower 0.3-0.4 blackish bristled; propleuron bare. ac 0+1, dc 2-4+3-4, strong. Scutellum with crossed ap and with one pair of discals. Ctenidium well developed. All femora, $t_3$ and rarely $t_2$ with long and dense ventral hairs; $f_3$ with numerous long and strong av and pv. $R_5$ open, $r_1$ bare, costal spine medium length, m-vein right-angled, m-cu more or less sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.9. Abdominal tergite III with strong mediomarginals, rarely absent or weak. Sternite II with long erect hairs, sternites III and V short setose. Segments VII+VIII square, without strong marginals. Cercus profile mid-wide, elongate, almost straight, apically hook-formed. Pregonite very long and narrow, curved, with several dorsal setae; postgonite short claw-shaped with 2-3 ventral bristles. Distiphallus tall and short, ventral lobes shortened, apical plate consists of a pair of well sclerotized lateral elongate arms, stylus narrow, almost straight, not very protruding (Plate XII, Fig. 210).

Body ground colouration dark grey. Head silvery grey or yellowish grey dusted, frontal vitta, antenna and palpus black, 2nd antennomere apically reddish. Thorax grey pollinose, longitudinal mesonotal stripes greyish black, sometimes indistinct. Legs black, wings hyaline, basicosta and epaulet yellow. Abdomen with dark chquered pattern. Abdominal tergite VII+VIII black, sometimes reddish distally, moderately grey pollinose, epandrium lustrous red or yellowish red, rarely blackish.

♀. Frons at narrowest part 0.36-0.39 head width, frontal vitta 1-1.5 times wider than parafrontal. Scutellum without ap. Mid femoral organ very big, situated in stoutest part of femur, reddish brown. Abdominal tergite VI divided mediodorsally, each half with 4-7 long and several short marginals, tergite VII small, membranous and bare, consisting of medium-sized central part and of a pair of very small pointed lateral plates, tergites VIII and IX reduced, tergite X very small, shortly haired. Genitalia reddish. Body colour paler than in ♂.

Body length 5-14 mm.

**Distribution:** Central and southern Europe including Germany and Poland, in Russia to Voronezh and Perm in the North, and soutwards to Georgia, Armenia and Azerbaijan, Kazakhstan and western Siberia, and Northwest China.

**Ecology:** Flies accompany dry forest steppes or steppes preferring limestone, loess and other dry edaphic substrates, ascending to 1.000 m a.s.l. or more – e.g. in mountain ranges in the Balkan Peninsula. Larval hosts unknown, but probably feeding on snails.

## Genus *Pierretia* Robineau-Desvoidy, 1863

Hist. Nat. Dipt. Paris 2: 422.
**Type species:** *Pierretia praecox* Robineau-Desvoidy, 1863 (syn. of *Sarcophaga nigriventris* Meigen, 1826).

Mostly dark grey, medium-sized flies. Parafacials very long, exceeding parafacial width; postegena and metacephalon with white or yellowish white hairs. Propleuron bare or haired; 3 pairs of postsutural dc; $r_1$ always bare. Apical plate of distiphallus without lateral arms; stylus elongate and narrow, bristle-shaped; ventral lobes well developed, distinctly separated from distiphallus; membranal lobes complete, distinctly protruding. (Plate X, Figs 7, 8, 9). ♀ with abdominal tergite forming a pair of lateral plates, tergites VII-X reduced. Majority of species are necrophagous or are parasitoids of invertebrates

(snails and arthropods), but some are obligatory snail parasitoids. About 30 species are distributed in different zoogeographical regions. 7 species occur in central Europe.

### Key to subgenera and species (♂♂) of *Pierretia*

1. Apical plate of distiphallus short, poorly sclerotized (subg. *Mehria* End.). Membranal process elongate, broad and serrate; ventral process broad and long, apically bilobate (Fig. 200) .............................. *P. (M.) nemoralis* (Kr.)
– Apical plate more or less elongate, well sclerotized (subg. *Pierretia* s. str.) .............. 2.
2. Apical plate narrow, elongate, directed distally and almost straight .............. 3.
– Apical plate short and widened, distinctly curved .............. 4.
3. Scutellar apicals present but often weak; apical plate gradually narrowing towards apex; ventral processes narrow, not serrate (Fig. 212) .............. *P.* (s. str.) *socrus* (Rd.)
– Scutellar apicals absent; apical plate acutely narrowing apically, ventral process widening and serrate (Fig. 205) .............. *P.* (s. str.) *villeneuvei* (Bött.)
4. Hind tibia without long hairs or with only single row of pv. Apical plate of distiphallus with short membranous curved dorsal process apically; membranal lobes broad, ovate (Fig. 203) .............................. *P.* (s. str.) *nigriventris* (Mg.)
– Hind tibia with long and dense hairs on pv and v surfaces, longest hairs often with wavy tips 5.
5. Membranal process short trilobate, with serrate hind lobe; ventral process elongate and with apical arm directed forwards and protruding under dorsal surface of apical plate (Fig. 202) .............................. *P.* (s. str.) *lunigera* (Bött.)
– Membranal process not lobate, elongate oval without serration. .............. 6.
6. Presutural ac absent; apical plate obtuse apically (Fig. 201) .............. *P.* (s. str.) *discifera* (Pand.)
– Presutural ac present, apical plate pointed apically (Fig. 204) .............. *P.* (s. str.) *soror* (Rd.)

### Subgenus *Mehria* Enderlein, 1928

Arch. Klassif. Phylog. Entomol. 1 (1): 29.
**Type species:** *Sarcophaga nemoralis* Kramer, 1908.

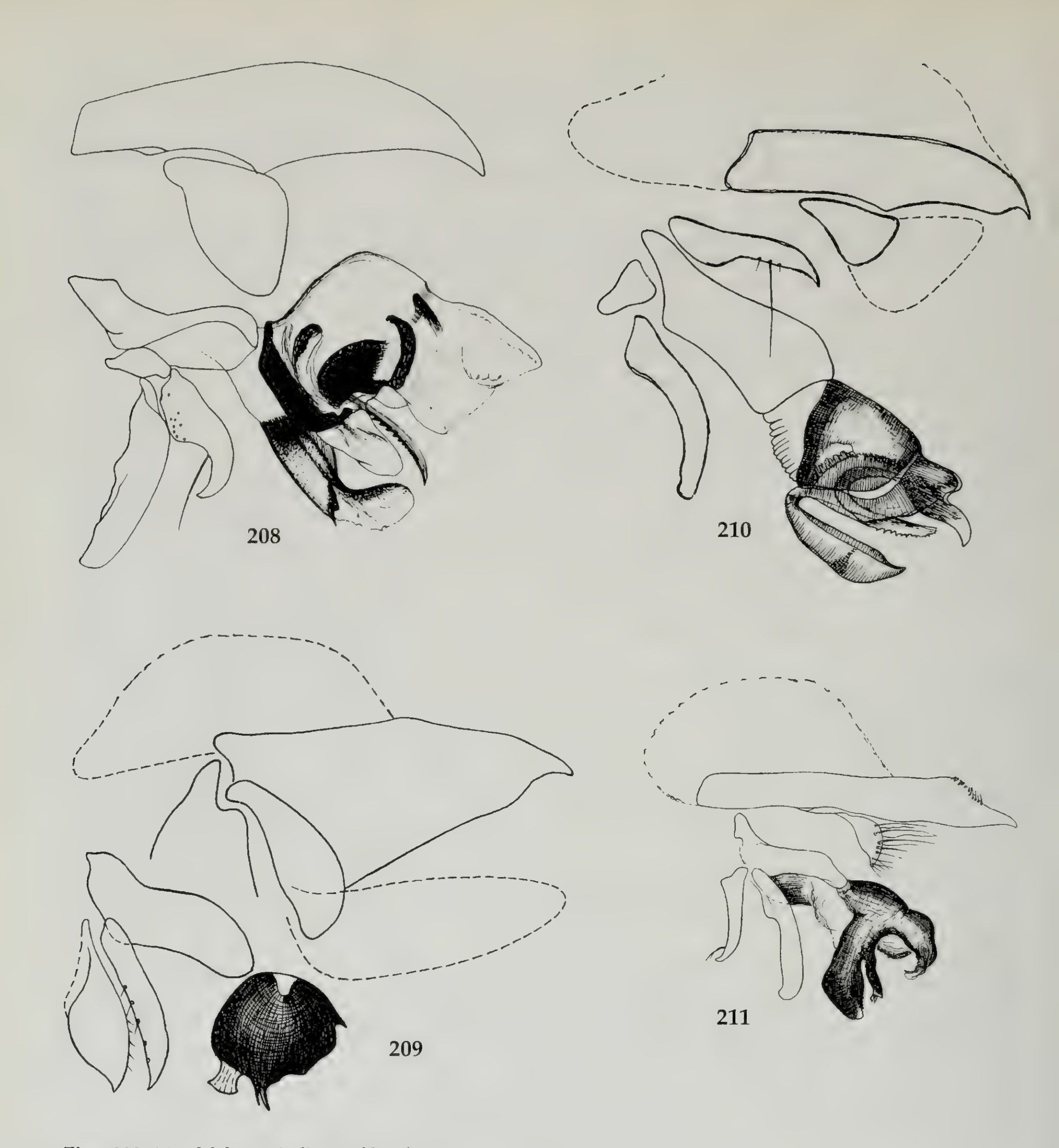
Propleuron bare. Apical plate of distiphallus shortened, poorly sclerotized; membranal process serrate. 2 species occur in the Palaearctic region: *P. nemoralis* (Kramer 1908), *P. otiophalla* Fan & Chen, 1981, and one in the Nearctic: *P. pulla* (Aldrich 1916).

### *Pierretia (Mehria) nemoralis* (Kramer, 1908)

Ent. Wbl. 25: 152 *(Sarcophaga).*

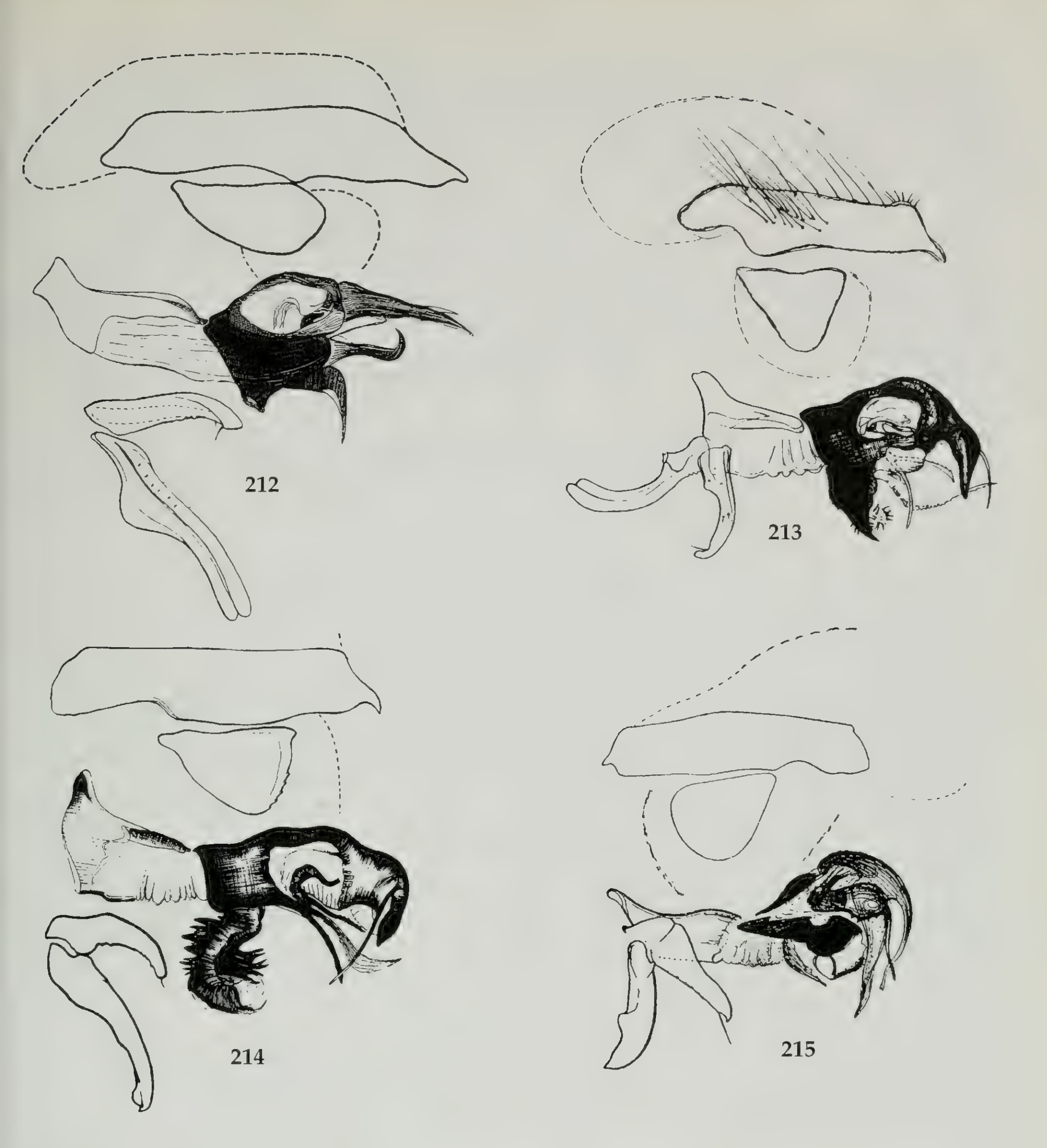
**Description**

♂. Frons at narrowest part 0.2-0.24, at vertex 0.26-0.29 and at antennal base 0.32-0.39 head width. Frontal vitta 1.4-2 times wider frontoventrally, frons at middle 1.5-2.3 times broader than parafrontal. 3rd antennomere 1.5-2 times longer than 2nd. Parafacial at antennal base 0.17-0.2 and gena 0.2-0.23 eye-height. Palpus long, apically moderately inflated. One row of prostorbitals; vte short, but distinct; fr 6-10, long and strong, crossed. Facial ridge at lower 0.2-0.3 with several short bristles. ac 0-2+1, dc 3+3, scutellum with crossed ap and 1-2 pairs of discals. Ctenidium indistinct; all femora and hind tibia with long ventral hairs, $f_2$ with complete rows of av and pv. Costal spine mid long, m-vein right or obtusely angled, m-cu sigmoid, ratio between 3rd and 5th costal sections 1 : 1-1.3. Abdominal tergite III with pair of strong erect marginals, sternite II with long erect hairs, sternites III and IV short setose, sternite




**Figs. 208.-211.** Male genitalia profile of:
**Fig. 208.** *Bellieriomima subulata*
**Fig. 209.** *Krameromyia anaces* (*setipennis* auct.)
**Fig. 210.** *Pandeleana protuberans*
**Fig. 211.** *Sarcotachinella sinuata*

V without "brush", but with short and dense hind hairs, segment VII+VIII square, without marginals. Cercus straight, apically hook-shaped; pregonite basally curved, apically obtuse, medium-length, postgonite almost same length as pregonite, hook-shaped, with 1-2 ventral bristles. Distiphallus tall and medium-length: apical plate short, apically pointed, with distinct preapical ventral spine; ventral process elongate and broad, apically bifurcate; membranal process trilobate, with serrate margina (Fig. 200).




**Figs. 212.-215.** Male genitalia profile of:
**Fig. 212.** *Pierretia socrus* (*spinosa* auct.)
**Fig. 213.** *Thyrsocnema incisilobata*
**Fig. 214.** *Thyesocnema kentejana*
**Fig. 215.** *Pseudothyrsocnema spinosa*

Body ground coloration pale grey. Head densely silvery grey or yellowish grey pollinose; frontal vitta black, moderately grey dusted, antenna and palpus black. Thorax pale grey dusted, longitudinal mesonotal stripes distinct. Legs black, wings hyaline. Abdominal pattern pale chequered. Genitalia black lustrous, segment VII+VIII with distinct pollinosity in posterior half.

♀. Frons at narrowest part 0.3-0.34 of head width, frontal vitta parallel-sided, as wide as parafrontal. Mid-femoral organ situated at distal 0.3 of femoral length, reddish or yellowish red.

Body length 5.5-11 mm.

**Distribution:** Central and northern Europe including Scandinavia to Karelia, southern Siberia and the Far East. The species accompanies shady forests from low elevations (where it is rare) up to the timberline (about 2.000 m a.s.l.) being focused in mountain beech stands simulating sometimes boreomontane pattern. It favours limestone habitats. Larval feeding is unknown, but the species is probably necrophagous and occasionaly parasitises in invertebrates such as snails and arthropods.

### Subgenus *Pierretia* Robineau-Desvoidy, 1863

Propleuron bare. Abdominal sternites II and III with erect hairs in ♂, sternite V without "brush", but with more or less long distal hairs. Cercus profile rather broad with apical hooklet, pregonite curved, mid-long, distinctly widening apically, apical plate well sclerotized. Mid-femoral organ absent in ♀s. 14 species occur in the Holarctic, Oriental and Afrotropical regions. 6 central European species.

### *Pierretia* (s. str.) *discifera* (Pandellé, 1896)

Revue Ent. 15: 196 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.23-0.25, at vertex 0.29-0.31 and at antennal base 0.39-0.42 head width. Frontal vitta 1.4-1.8 wider frontoventrally, frons middle 2-2.5 times broader than parafrontal. 3rd antennomere 1.4-1.8 times longer than 2nd. Parafacial at level of antennal base 0.21-0.23 and gena 0.24-0.28 eye height. Palpus long, apically moderately inflated. Two rows of postorbitals; vte short but well developed, fr 7-10, strong, long, crossed. 1-2 rows of long parafacials; facial ridge at lower 0.2-0.3 shortly bristled; ac 0-2-1, scutellum with crossed ap and 1-2 pairs of discals. All femora and hind tibia with long dense ventral hairs, $f_2$ with complete rows of av and pv. Abdominal tergite III with strong mediomarginals. Costal spine long, m-vein right-angled, m-cu distinctly sigmoid, ratio between 3rd and 5th costal sections 1 : 1.1. Sternites II-IV with numerous long erect hairs. Segments VII+VIII square and without marginals. Membranal lobes very distinct, and protruding, broad and elongate lobate, directed distally. Distiphallus long and moderately tall, apical plate mid-long, well sclerotized, ventrally concave, apically distinctly widening (Plate X, Figs 9, 201).

Body ground coloration dark grey. Head black, only parafacial, parafrontal, lunula and gena dark yellowish grey dusted. Thorax black, yellowish grey dusted, longitudinal mesonotal stripes well developed. Legs black, wings hyaline; abdomen with dark chequered pattern; genitalia lustrous black, segment VII+VIII distinctly grey pollinose.

♀ unknown.

Body length 6.5-10 mm.

**Distribution:** Pyrenees, Alps and Carpathians. The species accompanies montane forests on limestone and exceeds moderately the timberline (above 2.000 m). Demontane occurrence in Central Moravia (Moravian Karst) on limestone with microclimate inversion. Larval feeding unknown, but probably parasitoid of snails.

### *Pierretia* (s. str.) *lunigera* (Böttcher, 1914)

Dt. Ent. Z. 434 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.2-0.29, at vertex 0.29-0.33 and at antennal base 0.34-0.38 head width. Frontal vitta 1.2-2 times wider frontoventrally, frons middle 1.5-2.5 times broader than parafrontal. 3rd antennomere 1.6-2.1 longer than 2nd. Parafacial at antennal base 0.19-0.25 and gena 0.21-0.27 eye height. Palpus long, apically distinctly dilated. 2-3 rows of postorbitals; vte well developed, fr 5-8, long and strong, crossed. One row of parafacials; facial ridge haired at lower 0.3; ac 1-3+1, weak; 1-2 pairs of discals, one pair of scutellar ap. Ctenidium absent; all femora and hind tibia with long and dense

ventral hairs; $f_2$ with 3-4 strong av and 4-10 pv. Costal spine medium-length, m-vein right-angled, m-cu distinctly sigmoid, ratio between 3rd and 5th costal sections 1 : 0.9-1.1. Abdominal tergite III with strong pair of mediomarginals. Segment VII+VIII without marginals. Membranal process consists of 3 pointed lobes, basal one serrate; distiphallus long and tall, apical plate medium-length, terminally widening and obtuse, curved ventrally; harpe short and small; ventral arms elongate, consisting of three processes distally, medial one prominent and directed dorsally; stylus long and narrow, not exceeding tip of distiphallus (Plate X, Fig. 8, Fig. 202).

Body ground coloration dark grey. Head dark yellowish grey and/or whitish grey pollinose, antenna and palpus black. Thorax grey pollinose, longitudinal mesonotal stripes greyish black, distinctive. Abdominal pattern dark chequered. Segment VII+VIII without pollinosity. Genitalia lustrous black.

♀. Frons at narrowest part 0.27-0.3 times wider than parafrontal, frontal vitta parallel-sided, as broad or slightly broader than parafrontal. Genitalia black.

Body length 5.5-10 mm.

**Distribution:** Alps, Carpathians, Caucasus. This montane species accompanies mountain forests, preferring limestone habitats, frequently together with *P. discifera,* latter being more heliophilic. Demontane occurrence in Moravian Karst in inversion mesoclimate.

### *Pierretia* (s. str.) *nigriventris* (Meigen, 1826)

Syst. Beschr. 5: 27 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.25-0.33, at vertex 0.3-0.37 and at antennal base 0.35-0.43 head width. Frontal vitta 1-1.3 widening frontoventrally, frons middle 1.2-2.2 times wider than parafrontal. 3rd antennomere 1.5-2.4 times longer than 2nd. Parafacial at level of antennal base 0.2-0.24 and gena 0.18-0.25 eye height. Palpus long, apically inflated. 1-2 rows of postorbitals, vte distinct, fr 5-8, strong and crossed. One row of parafacials, facial ridge with some setae at lower 0.1-0.2; ac 1-3+0-1, weak. Scutellum with crossed ap and 1-2 pairs of discals. Ctenidium absent; all femora with not very long and thin ventral hairs, hind tibia without hairs at lower surface, or with some pv hairs showing, however, straight tips. Costal spine long and strong, m-vein right-angled, m-cu distinctly sigmoid; ratio between 3rd and 5th costal sections 1 : 1-1.4. 3rd abdominal tergite with pair of strong mediomarginals. Segment VII+VIII without marginals. Membranal process large, protruding, elongate and broad, directed apically; harpe and ventral processes of same length, nearly straight and lanceolate; apical plate narrow and pointed, with poorly sclerotized dorsal appendix (Fig. 203).

Body ground coloration dark grey. Head dark silvery grey or yellowish grey dusted, antenna and palpus black. Thorax densely yellowish grey dusted, longitudinal mesonotal stripes distinct, blackish and broad. Abdominal pattern dark chequered. Legs black, wings hyaline. Genitalia black lustrous, smooth.

♀. Frons at narrowest part 0.35-0.4 of head width. Generally rather similar to ♀s of *Pierretia* (s. str.) *soror* but less setose.

Body length 3.5-8.5 mm.

**Distribution:** Widely distributed in Europe, reaching Denmark in the North and spreading eastwards through Ukraine and southern Russia to northern Caucasus, Transcaucasia up to Russian Far East; an expansive mediterranean element.

**Ecology:** The species is very adaptive; it occurs especially in dry sunlit habitats of both natural and secondary character, population densities distinctly decreasing in north of the distributional area and at high elevations. Flies feed at flowers of *Achillea, Rhamnus, Euphorbia, Pyrethrum, Bellis, Thymus* etc. Larvae breed in mumified invertebrates and parasitize snails and acridoid locusts: e.g. *Brephulopsis cylindrica, Cepaea nemoralis, Cornuella* sp., *Ebonia* sp., *Helicella ericetorum itala, Helix aspersa, H. cantianiformis, H. pomatia, Monacha* sp., *Theba cantiana, Helix nemoralis* (Bowell 1917, Böttcher 1913, Keilin 1919, Séguy 1941a, 1953, Miles 1968, Barfoot 1969, Beaver 1972, Cameron & Disney 1975, Pape 1987b, Richet 1990, and own observations); *Schistocerca gregaria* (Séguy 1932); carabid larvae *(Carabus coriaceus)*, adult

*Nicrophorus humator, Blaps macronata* (Emden 1950), *Bombus terrestris* (Smith 1957). According to Pape (1987b) larvae mature within the maternal uterus and are nourished by secretions from accessory glands. The female larviposits second instar larvae directly on to a suitable host. This is one of the most specialized reproduction strategies known in Sarcophaginae.

### *Pierretia* (s. str.) *socrus* (Rondani, 1860)

Atti Soc. Ital. Sci Nat. 3: 387 *(Sarcophaga).*

*Sarcophaga rostrata* Pandellé, 1896. Revue Ent. 15: 203.

♂. Frons at narrowest part 0.23-0.28, at vertex 0.27-0.36 at antennal base 0.34-0.4 head width. Frontal vitta 1-1.5 times wider frontoventrally (orally), frons middle 1.2-2 times wider than parafrontal. 3rd antennomere 1.8-2.5 times longer than 2nd, arista haired, long hairs 3-4.5 times longer than 2nd aristomere; parafacial at antennal base 0.31-0.26 and gena 0.23-0.33 eye height. Palpus long, apically distinctly dilated. 1-2 rows of postorbital setae; vte distinct, fr 6-10, strong and crossed. 1-2 rows of parafacials, facial ridge with some short bristles at lower 0.1-0.2; ac 1-3+1, rather delicate; scutellum with crossed ap and one pair of d. Ctenidium absent, all femora with thin and short ventral setae, $f_2$ with complete rows of av and pv, hind tibia with or without some pv and without ventral setae. Costal spine mid-long, m-vein right-angled, m-cu distinctly sigmoid, ratio between 3rd and 5th costal sections 1:1-1.2. Abdominal tergite III with one pair of strong mediomarginals. Segment VII+VIII without marginals, shortened. Membranal lobes short and rounded, tuberculate. Aedeagus elongate, with long and narrow pointed apical plate; harpe distinct, elongate, right-angled curved ventrally, apex obtuse; ventral process long and narrow, curved dorsally, apex pointed (Fig. 212).

Body ground coloration dark grey. Head densely yellowish grey or whitish grey dusted, antenna and palpus black. Thorax grey pollinose, longitudinal mesonotal stripes distinct, legs black, wings hyaline, abdominal pattern dark grey chequered; genitalia not dusted, lustrous black.

♀. Frons at narrowest part 0.31-0.36 head width, frontal vitta same long as parafrontal. Very similar to ♀ of *Pierretia* (s. str.) *villeneuvei* (Bött.), but aristal hairs distinctly longer (up to 3-4.5 times longer than 2nd aristomere).

Body length 4-8.5 mm.

**Distribution:** Europe except the British Isles, northern Germany, Finland, Baltic Republics, in Russia to Perm and the Far East. The flies present ecological problems. They are strictly heliophilous and ascend to considerable altitudes, showing distinct hilltopping strategy in mountains. At lower elevations they seek sunlit hilltops in forested habitats and occur also on sea shores (of the Mediterranean). Larval feeding remains unknown.

### *Pierretia* (s. str.) *soror* (Rondani, 1860)

Atti Soc. Ital. Sci. Nat. 3: 386 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.23-0.28, at vertex 0.25-0.30 and at antennal base 0.31-0.38 head width. Frontal vitta 1.2-1.5 times wider frontoventrally, frons middle 1.2-1.7 times wider than parafrontal. 3rd antennomere 1.5-2.4 times longer than 2nd. Parafacial at level of antennal base 0.19-0.35 and gena 0.23-0.30 eye heigth. Palpus long, apically distinctly inflated. 1-2 rows of postorbital setae; vte poorly developed, fr 6-9, strong and crossed. One row of parafacial bristles, only 2-3 longer than parafacial width. Facial ridge with few hairs at lower 0.1-0.2; ac 2-3+0, sometimes very weak prescutellar ac. Scutellum with crossed ap and with 1-2 pairs of discals. Ctenidium absent, all femora with long and dense ventral hairs, $t_3$ with long av and pv, longest of them showing wavy tips. Costal spine moderately long, m-vein right-angled, m-cu strongly sigmoid, ratio between 3rd and 5th costal sections 1:1-1.3. Abdominal tergite III with pair of strong erect mediomarginals. Segment VII+VIII, quadrate without marginals. Membranal lobe very large, strongly protruding, elongate and broad, without arms, not serrate. Harpe almost as long as membranal lobes, moderately broad, apex serrate.

Ventral process very long and narrow, bristle-like, close to ventral margin of apical plate, curved ventrally. Apical plate moderately long, curved ventrally, apically pointed. Stylus moderately long and narrow, not protruding (Fig. 204).

Body ground coloration dark grey. Head densely silvery white or yellowish white pollinose, palpus and antenna black. Thorax and abdomen coloration same as in *P. socrus*. Genitalia lustrous black.

♀. From ♀ *P. nigriventris* not essentially different, both species having white-haired gena on posterior part adjacent to postgena.

Body length 3.5-10.5 mm.

**Distribution:** Europe to southern Norway and Sweden, and to St. Petersbourgh in the north and to Perm in the east; recorded from Ireland, not from Great Britain; (northern) Caucasus. Flies are heliophilic and prefer limestone habitats, mainly cliffs of mountain elevations, sometimes up to 2.000 m (in the Alps and Carpathians), Balkan Peninsula, less common at lower elevations and in other edaphic conditions. Flies hatched from *Helix aspersa* (Séguy 1921) and from dead snails (Rohdendorf 1937).

### *Pierretia* (s. str.) *villeneuvei* (Böttcher, 1912)

Dt. ent. Z. 4: 347 *(Sarcophaga)*.

**Description**

♂. Frons at narrowest part 0.25-0.32, vertex 0.28-0.32 and at antennal base 0.33-0.36 head width. Frontal vitta 1.1-1.3 times widening frontoventrally, frons middle 1-2.3 times wider than parafrontal. 3rd antennomere 1.8-2.6 times longer than 2nd, arista with longest hairs 1.5-3 times longer than 2nd antennomere. Parafacial at level of antennal base 0.21-0.25 and gena 0.19-0.3 eye height. Palpus long, apically inflated. One row of postorbitals, vte strong, fr 6-8, long and crossed. Parafacial with one row of bristles, facial ridge with few hairs at lower 0.1-0.2, White postgenal hairs not expanding to posterior part of gena. ac 1-2+0, sometimes very weak, prescutellar ac distinct. Scutellum without ap and with one pair of discals. Ctenidium absent, all femora with thin medium-length ventral hairs, $t_3$ with few or without pv. Costal spine long, m-vein right-angled, m-cu distinctly sigmoid, ratio between 3rd and 5th costal sections 1 : 0.7-1.2. Abdominal tergite III with pair of strong mediomarginal bristles. Segment VII+VIII quadrate without marginals. Membranal lobe short and rounded. Distiphallus moderately long and tall, apical plate almost straight, apically sharply narrowing and pointed; harpe indistinct, ventral process long and broad, curved with serrate margin (Fig. 205).

Body ground coloration deep grey; parafrontal, parafacial and gena densely deep silvery pollinose, antenna and palpus black. Thorax grey dusted, with distinct longitudinal mesonotal stripes, legs black, wings hyaline, abdomen with dark chequered pattern; genitalia lustrous black without pruinosity.

♀. Very similar to ♀ of *P. socrus*, but hairs on arista distinctly shorter.

Body length 3.5-7.5 mm.

**Distribution:** Europe including Scandinavia, western Siberia, Russian Far East (Primorye), northern China. Flies accompany humid habitats, e.g. lowland forests near rivers and ponds, acid natural meadows and swamps. A rare species. Larval feeding unknown.

## Genus *Thyrsocnema* Enderlein, 1928

Arch. klassif. Phylogen. Ent. 1 (1): 42.

**Type species:** *Musca striata* sensu Enderlein, 1928 (misidentification, nec Fabricius, 1794) (synonym of *Sarcophaga incisilobata* Pandellé, 1896).

Grey flies of different size. 3rd antennomere 1.5-2.5 times longer than 2nd, arista with very long hairs. Occiput and postgena with numerous white or yellowish white hairs, gena black-haired. Parafacial with 1-2 vertical bristle rows, longest of them as long as parafacial width. Propleuron bare. ac 0-2+1, not very strong, or delicate; dc 2-3+3, long and strong. ♂ scutellum with ap, ♀ scutellum without ap.

All ♂ femora with long dense ventral hairs, $f_2$ with complete rows of av and pv $t_3$ with long av and pv, hind trochanter with short ventromedial setae; mid-femoral organ in ♀s indistinct, small or medium-sized, situated at middle of $f_2$, brown or black; $R_5$ open, $r_1$ bare, $r_{4+5}$ with setose base; costal spine well developed; m-vein right or obtuse-angled, m-cu distinctly sigmoid; ♂ with abdominal segment V without distinct "brush", but with numerous thick hairs distally; segment VII+VIII square, without marginals. Cercus long and moderately thick, rather parallel-sided apically widened and with distinct and characteristic spine-shaped tip. Pregonite curved, obtuse with distinct longitudinal furrow distally, postgonite as long as pregonite, moderately curved, claw-shaped. Membranal process divided into a single medial, and paired lateral lobe, densely spinolate. Distiphallus moderately long and moderately high; harpe and ventral process elongate and narrow, rather protruding; stylus bristle-shaped, projecting dorsally, moderately curved; apical plate elongate tapering into an obtuse or pointed tip and with a pair of bristle-shaped lateral arms on dorsal surface of apical plate bases (Plate IX, Fig. 11). ♀s with abdominal tergite VI divided dorsally, with widely spaced marginal bristles and long marginal hairs; tergite VII very small but distinct, membranous and bare; tergites VIII-X absent. Antenna and palpus black, legs black, wings hyaline, abdominal pattern dark chequered; ♂ genitalia black, ♀ genitalia black or reddish. About 9 plaearctic species, partly not cleared taxonomically. 2 species in central Europe.

### Key to species (♂♂) of *Thyrsocnema*

1. Spinolate lobes of membranal process shorter than medial lobe; harpe regularly curved (Fig. 213) ........ *T. incisilobata* (Pand.)
– Spinolate lobes of membranal process same long as medial lobe or longer; harpe sigmoid (Fig. 214) ........ *T. kentejana* Rohd.

### *Thyrsocnema* (s. str.) *incisilobata* (Pandellé, 1896)

Revue Ent. 15: 197 *(Sarcophaga)*.

**Description**

♂. Frons at narrowest part 0.22-0.35, at vertex 0.25-0.29 and at antennal base 0.35-0.4 head width; frontal vitta 1.1-1.6 times wider frontoventrally; frons middle 1.5-2.5 times wider than parafrontal. 3rd antennomere 1.7-2 times longer than 2nd. Parafacial at antennal base 0.2-0.26 and gena 0.22-0.27 eye height. Palpus long, apically distinctly dilated; one or rarely two rows of postorbitals; vte either absent or distinct, but short; fr 7-10, long and strong, crossed. Facial ridge with numerous black setae at lower 0.3-0.4; ac 0+1. Scutellum with 1-3 pairs of distinct d. Ctenidium well developed; ratio between 3rd and 5th costal sections 1 : 0.7-1. Abdominal tergite III usually without mediomarginals, or with one poorly indicated pair; sternite II with long erect hairs. Sternites III and IV with short setae. Lateral lobes of membranal process distinctly shorter than lateral lobe, harpe basally widening, apically narrow, bristle-shaped and distinctly curved; apical plate distinctly longer than basal width (Fig. 213).

Head densely silvery dusted, frontal vitta black, slightly grey pollinose.

♀. Frons at narrowest part 0.32-0.36 head width. Abdominal VII tergite very small, rounded.

Body length 5.5-14.5 mm.

**Distribution:** Widely distributed throughout West Palaearctic from British Isles to western Siberia, and from southern Scandinavia to North Africa (Algeria). Euryoecious species with strong culturophilic tendencies, occuring in secondary changed habitats. Flies feed at flowers, fruits, meat and faeces. Larvae are predators of coprophagous fly larvae (maggots) in faeces, and predators and/or parasitoids of snails (*Helix lactea* – Keilin, 1919), acridoid grasshoppers (*Stauroderus maroccanus* – Séguy, 1941a), pupae of *Lymantria monacha* (Komárek 1938) and may cause urinary myiasis in man (Povolný & Pospíšil 1980).

### *Thyrsocnema* (s. str.) *kentejana* Rohdendorf, 1937

Fauna SSSR 19 (1): 174.

*Thyrsocnema niculescui* Lehrer, 1994, **syn. nov.** Bull. Soc. Ent. Mulhouse (1994) 37.

For other repeated synonyms by Lehrer see e.g. Verves (1986), Catal. Pal. Dipt. 12: 145.

**Description**

♂. Frons at narrowest part 0.21-0.24, at vertex 0.24-0.29 and at antennal base 0.34-0.38 head width. Frontal vitta 1.3-1.8 times wider frontoventrally, frons middle 1.4-2 times wider than parafrontale. 3rd antennomere 1.6-1.8 longer than 2nd. Parafacial at antennal base 0.18, gena 0.16-0.25 eye height. Palpus long, apex distinctly dilated. Postorbitals 1-2 rows, vte short or indistinct; fr 7-12, strong and crossed, parafacial with one row of bristles, facial ridge at lower 0.3-0.5 shortly haired; ac 1-3+1. Ctenidium well developed; ratio between 3rd and 5th costal sections 1 : 0.8-1. Abdominal tergite III without strong mediomarginals, sometimes with delicate hairs. Abdominal sternites II-IV with long erect hairs. Spinose lobes of membranal process as long as or longer than medial lobe; harpe fasciate, sigmoid, apically pointed; apical plate short, as long as its basal width (Fig. 214).

Body ground coloration as in *Th. incisilobata.*

♀. Not distinguishable from ♀ of *Th. incisilobata.*

Body length 4-11.5 mm.

**Distribution:** An exemplary boreomontane element occurring in northern Scandinavia and northern Siberia to Far East and in the central European Alps (Switzerland, Austria, France), Carpathians (Romania) and Balkan mountains (Bulgaria); mountain ranges of Kazakhstan, Mongolia and North of China. Flies feed on fresh montane vegetation and show partly culturophile tendencies in eastern parts of distribution (Petrova 1968).

### Subtribe *Parasarcophagina* Rohdendorf, 1965

Ent. Obozr. 44 (3): 679.

Grey flies of various sizes. ♂ frons at narrowest part not more than 0.3 of head width, 3rd antennomere at least 2 times longer than 2nd; 4-7 postsutural dc, anterior 1-4 rather delicate and first of strong bristles distinctly closer to second than to suture. Postgena and occiput with long and dense pale hairs. ♂ genitalia with segment VII+VIII short, more or less square, membranal lobes well developed, complete; apical distiphallus plate well developed, usually strongly sclerotized, often with lateral arms; stylus long and narrow, bristle-shaped, sometimes shortened *(Phallocheira)* or covered by membranous "envelope" *(Liopygia)*; ♀ genitalia with tergite VI usually divided dorsally, tergites VII-VIII partly reduced, membranous but distinct; sternite VI short and broad.

The tribe comprises 34 genera and more than 270 species in all zoogeographical regions; 6 genera and 18 species are found in central Europe. Larvae schizophagous, rarely parasitoids or predators of invertebrates.

**References:** Rohdendorf, 1937: Fauna SSSR, 19 (1): 191-267; Kano et al. 1967: Sarcophagidae, Fauna jap. 7: 38-87; Povolný 1987: Acta ent. Mus. natn. Pragae 42: 149-187.

### Genus *Bercaea* Robineau-Desvoidy, 1863

Hist. Nat. 2: 549.
**Type species:** *Musca haemorrhoidalis* Fallén 1817 (syn. *Sarcophaga cruentata* Meigen, 1826).

*Coprosarcophaga* Rohdendorf, 1937. Fauna SSSR 19, 1: 293.
**Type species:** *Musca haemorrhoidalis* Fallén, 1817.

Medium-sized to large flies of grey coloration. 3rd antennomere 1.5-3 times longer than 2nd, arista with long hairs; 2-3 rows of short, hairy parafacials, longest of them shorter than parafacial width.

Vibrissae situated at oral margin, last of them laterally protruding. Whitish hairs on postgena and occiput extending at least to posterior half of gena; propleuron bare; prosternum hairy posteriorly; lateral postscutellar plates setose; ac absent, postsutural dc 5-6, only posterior 2-3 strong; scutellum with one pair of d, apical bristles present in ♂, absent in ♀; $R_5$ open, $r_1$ bare; ctenidium well developed, ventromedial parts of hind trochanter with numerous stout setae; surface of abdominal sternite II covered with long erect hairs, sternites III and IV shortly setose, lateral and hind margins with long hairs; sternite V deeply cleft and with spinose lobes on inner side distally. Segment VII+VIII moderately elongate, 1.5 times longer than wide, with several moderately long and not very strong marginal bristles; cercus more or less flattened dorsoventrally and distinctly separated distally with a longitudinal keel apically, and apex pointed; pregonite longer than postgonite, both pointed apically; basiphallus very short, paraphallus elongate, not less than 4-5 times longer than broad (tall); membranal lobes long, well sclerotized, situated vertically to longitudinal distiphallus axis, foliate; ventral lobes distinct, hook-shaped; apical plate shortened, tapering ventrally, with more or less developed lateral arms, well widenied; apically stylus bristle-shaped, curved (Fig. 216).

♂. Mid-femoral organ very large, but often less distinct, blackish. Abdominal tergite VI deeply separated dorsally, with numerous moderately long marginals and in addition densely haired at apical 0.4-0.6; tergites VII-VIII poorly developed or absent; tergite X small, crescent-shaped with numerous short setae. Sternites VI and VII broad and short, sternite VI with straight hind margin and with 6-13 marginals, sternite VII with triangulate elevation at centre of hind margin and with 2-5 pairs of lateromarginals. Body colour greyish (hardly dark grey), abdomen pattern chequered, genitalia red to reddish yellow, wings hyaline.

5 Afrotropical species, one of them *(B. cruentata)* extending northwards to the temperate zone, culturophile to synanthropic tending towards cosmopolitanism. Larvae schizophagous, mostly coprophagous and predators.

**References:** Rohdendorf 1937: Fauna SSSR 19 (1): 293-296; Kano et al. 1967: Fauna Japonica, Sarcophagidae, 9-11; Zumpt 1972: Explor. Parc. Nat. Virunga, Miss. G. F. De Witte, Fasc. 101; 42, 100-109; Pape 1987: Fauna Entomol. Scand. 19: 158-160.

### *Bercaea cruentata* (Meigen, 1826)

Syst. Beschr. 5: 28 *(Sarcophaga).*

*Musca haemorrhoidalis* auctorum, nec Fallén, 1817.

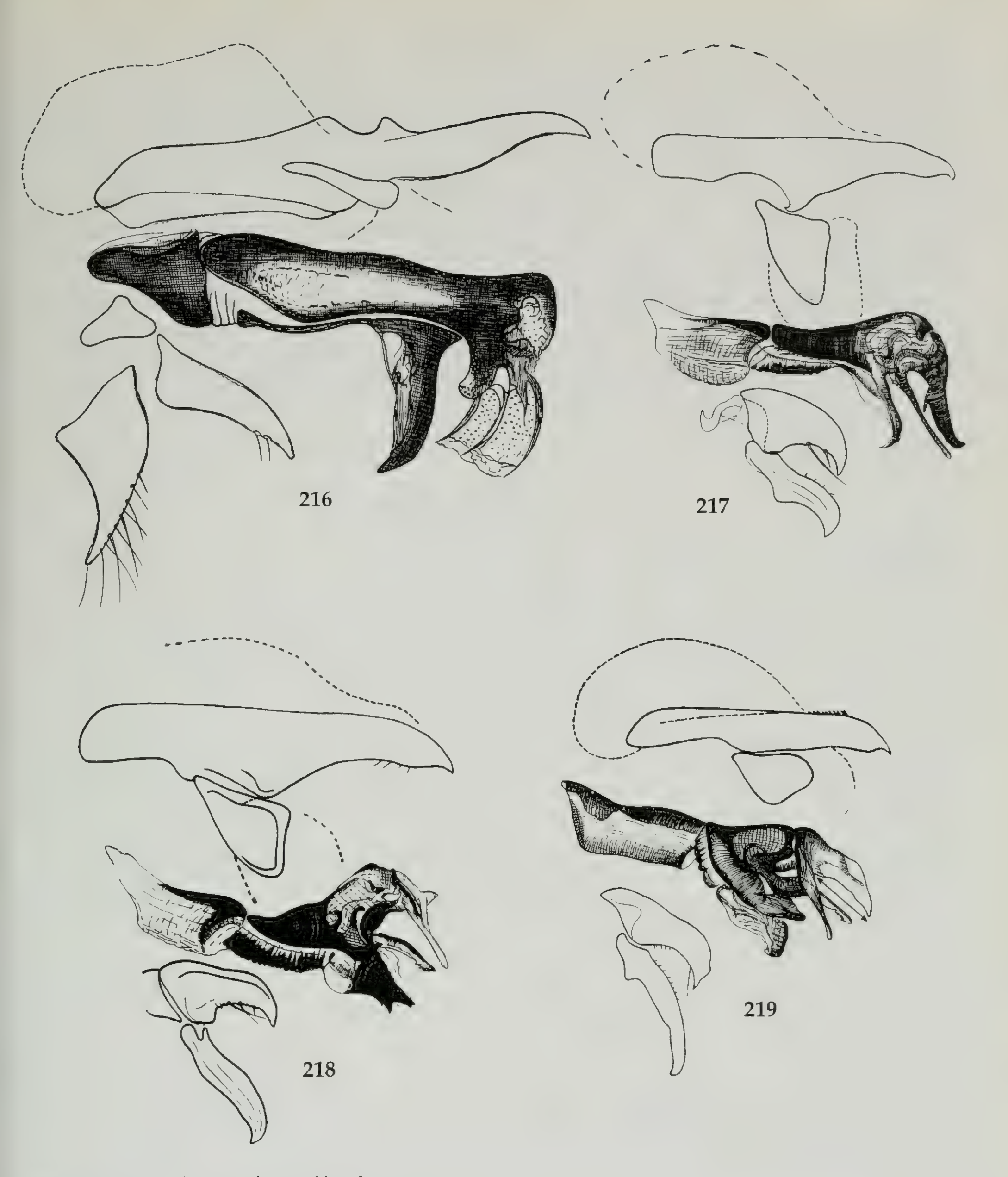
**Description**

♂. Frons at narrowest part 0.21-0.28, at vertex 0.24-0.31 and at antennal base 0.38-1.48 head width; frontal vitta 1.3-1.7 times wider frontoventrally, frons at middle 1.8-3 times wider than parafrontal; 3rd antennomere 2-3 times longer than 2nd; parafacial at antennal base 0.24-0.28, gena 0.26-0.41 eye height. Palpus long, apex moderately widening. Postorbitals one row, vte indistinct or absent, ocellar bristles delicate, hairy; fr 9-14, only 3-5 pairs strong and crossed, facial ridge bristled at lower 0.4-0.5; all femora and hind tibia long and densely haired ventrally; costal spine very small, often indistinct, m-vein right- or acute-angled, m-cu vein distinctly sigmoid; ratio between 3rd and 5th costal sections 1 : 0.5-0.7. Abdominal tergite III without mediomarginals; cercus profile long and narrow, almost straight, apically pointed, dorsally hunched at base of apex; pregonite almost straight, with broad base, distinctly narrowing apically; ventral lobe small, almost straight, pointed, apical plate with short lateral arms (Plate XII, Fig. 216).

Body ground coloration grey, orbits, parafacial and lunula silvery whitish or golden dusted, gena dark yellowish grey pollinose, palpus and antenna black, 3rd antennomere mostly grey or brownish; legs black, wings hyaline; abdominal segment VII+VIII complete, yellowish red, red brownish or black, apical half dusted, epandrium reddish yellow to red, lustrous, in rare instances (late autumn specimens) blackish.

♀. Frons at narrowest part 0.3-0.38 head width; tergites VII and VIII reduced. Genitalia red to reddish yellow.

Body legth 6-15 mm.




**Figs. 216.-219.** Male genitalia profile of:
**Fig. 216.** *Bercaea cruentata* (*haemorrhoidalis* auct.)
**Fig. 217.** *Liosarcophaga tibialis* (*beckeri* auct.)
**Fig. 218.** *Liosarcophaga aegyptica (parkeri)*
**Fig. 219.** *Liosarcophaga emdeni*

**Distribution:** Widely distributed in the Holarctic, Afrotropical, Oriental and Neotropical regions. Hemisynanthropic and culturophile. The species develops exclusively in urban populations in its northern limits (e.g. northern Germany, Poland, Denmark etc.). Flies feed on faeces, animal carcasses and decaying substrates; rarely at flowers. Frequently bred from human faeces (Böttcher 1913,

Rohdendorf 1937, Séguy 1941a, Sychevskaya 1960 etc.), various kinds of dung (pork, loaf, fish and fowl), meat (Zakharova 1961), maritime carcasses (Cephalopods and Echinoids – Artamonov 1987) producing facultative myiasis in man and animals (Aldrich 1916, Patton & Evans 1929, Zumpt 1965, Jabbar 1974, Khan et al. 1984, etc.). Bred from bird nests (*Troglodytes aedon* - Eichler 1937), acridoid grasshoppers, e.g. *Melanoplis* sp., *M. differentialis, Dociostaurus maroccanus, Locusta migratoria, Schistocerca gregaria, S. cancellata* (Rees 1973), *Pachytylus migratorius* (Baer 1921), snails – *Helix aspersa, Euparyphia pisana, Eobania vermicularis, Cepaea nemoralis* (Berner 1960). Flies are passive mechanic vectors of dysentery bacteria (Sychevskaya, Scopina & Petrova 1959; Sychevskaya, Grudicina & Vyrvichvost 1959), *Sylmonella paratyphi* A, B, *S. typhi* (Greenberg et al. 1971), protozoan cysts of *Entomoeba histolytica, Bodo caudata* (Trofimov & Engelhardt 1965), oncosphaers of tapeworms *Hymenolepis nana, Taeniarrhynchus saginatus*, eggs of nematode *Trichocephalus trichiurus* (Sychevskaya & Petrova 1958, Alakhverdyanc & Sakharova 1961, Nadzhafarov 1967). Pupal parasitoids of *B. cruentata* are: Braconidae (*Aphaereta minuta),* Chalcididae *(Brachymeris fonscolombei, B. minuta, Euchalcidia blanda, Nasonia vitripennis),* Euscoliidae *(Euscolia trichopsila)*, Figitidae *(Figites discordis, F. scutellaris)*, Pteromalidae *(Mormoniella vitripennis)*, Spalangiidae (*Spalangia* sp.): see Baer 1921, Thompson 1943, Belizin, 1963, Sychevskaya 1964, Raes 1973, Zhiang & Liang 1988).

## Genus *Liosarcophaga* Enderlein, 1928

Arch. klassif. Phylogen. Ent. 1 (1): 18.
**Type species:** *Cynomyia madeirensis* Schiner, 1868.

Grey flies of medium to large size. Parafacial narrow, rarely broad, gena 0.25-0.33 eye height. 3rd antennomere 1.5-3 times longer than 2nd, arista with long hairs; 1-3 rows of parafacial bristles, longest of them usually shorter than parafacial width. Vibrissae situated at oral margin, last distinctly protruding in profile. Postgena and occiput with white hairs, gena black and white haired. Proboscis long. Propleuron bare; ac usually 0+1, sometimes praescutellar bristles poorly developed: postsutural dc 4-7, only 2-3 posterior distinct; apicoscutellars more or less distinct in ♂, poor or absent in ♀; discals usually one pair, rare 2-3 pairs; $R_5$ broadly open, $r_1$ bare; abdominal tergite III usually without mediomarginals. ♂ with sternite V- or Y-shaped, with well developed, spinolate "brush". Segment VII+VIII shortened, square or quadrate, marginal bristles usualy weak or absent, rarely strong. Cercus without dorsal protuberance, apically pointed, more or less curved ventrally or nearly straight, hairy or bristled, never spinose; pregonite usually longer than hook-shaped postgonite; basiphallus shortened, distiphallus more or less elongate and robust or stout; ventral lobes distinctly differentiated; one or two pairs of membranal lobes; apical plate with lateral arms well developed; stylus long and narrow, bristle-shaped.

♀ Mid-femoral organ large, situated usually at strongest part of femur; abdominal tergite VI complete or separated dorsally with long marginal bristles; tergite VIII membranous, but distinct; tergite VII poorly developed or absent.

Body coloration as usual in sarcophagine flies, abdomen with chequered pattern, genitalia black, red or reddish.

Larvae are mostly sarcophagous or coprophagous, facultative parasitoids or predators of invertebrates. Some species tend to culturophily and synanthropy. Some 90 species are distributed in different regions, the genus being absent from the Neotropics and New Zealand. 10 species occur in central Europe, several of them endangered.

### Key to species and subgenera of *Liosarcophaga*

1. Two pairs of poorly sclerotized, pointed membranal processes; medial process of interior distiphallus part very large, situated at apical plate, both processes nearly same length, epandrium black (subgenus *Pandelleisca* – Fig. 226) ........ *L. (P.) similis* (Meade)
– One pair of membranal processes ........ 2.

2. Apical plate perpendicular to paraphallus and elongate (subgenus Curranea), with bristle-shaped lateral arms, membranal processes broad, hook-shaped, epandrium red (Fig. 217) ........................ ........................................................................................................... *L. (C.) tibialis* (Macquart)

– Apical plate situated more or less longitudinally in elongate distiphallus axis as appendix of paraphallus (subgenus *Liosarcophaga* s. str.) ........................................................................................ 3.

3. Epandrium red or yellowish red, sometimes brownish red ............................................................ 4.

– Epandrium black or brownish black. ................................................................................................. 5.

4. Lateral arms of elongate, narrow apical plate distinctly sigmoid, apically with 2 short spinolate appendages; ventral process broader than membranal process (Fig. 224) ......................................... ........................................................................................................ L. (s. str.) *jacobsoni* (Rohd.)

– Lateral arms of short and broad apical plate almost straight, apex obtuse, without spines; ventral process as wide or slightly narrower than membranal process (Fig. 218) ......................................... ........................................................................................................ L.(s. str.) *aegyptica* (Salem)

5. Apical plate long and broad, as long as its lateral arms, centrally separated into two lateral lobes (Fig. 219) ........................................................................................................ L. (s. str.) *emdeni* (Rohd.)

– Apical plate distinctly shorter than lateral arms, complete ............................................................. 6.

6. Stylus as broad as short and obtuse ventral lobe, apical plate almost as long as paraphallus, apex widened (Fig. 220) .................................................................................. L. (s. str.) *teretirostris* (Pandellé)

– Stylus distinctly narrower than elongate and pointed ventral lobe; apical plate shorter than paraphallus, apically narrowed and pointed ......................................................................................... 7.

7. Cercus apically narrow and distinctly sigmoid; dorsal spine of lateral arms situated nearer to their tip (Fig. 225) ................................................................................................. L. (s. str.) *tuberosa* (Pandellé)

– Cercus apically broader and not sigmoid ............................................................................................ 8.

8. Cercus with a distinct ventral preapical protuberance; lateral arms with dorsal spine close to apex, pregonite gradually tapering (Fig. 221) ..................................................... L.(s. str.) *harpax* (Pandellé)

– Cercus without preapical ventral dilatation ......................................................................................... 9.

9. Pregonite centre distinctly inflated, apex sickle-shaped; lateral arms with dorsal spine near their middle (Fig. 222) ............................................................................. L. (s. str.) *portshinskyi* (Rohdendorf)

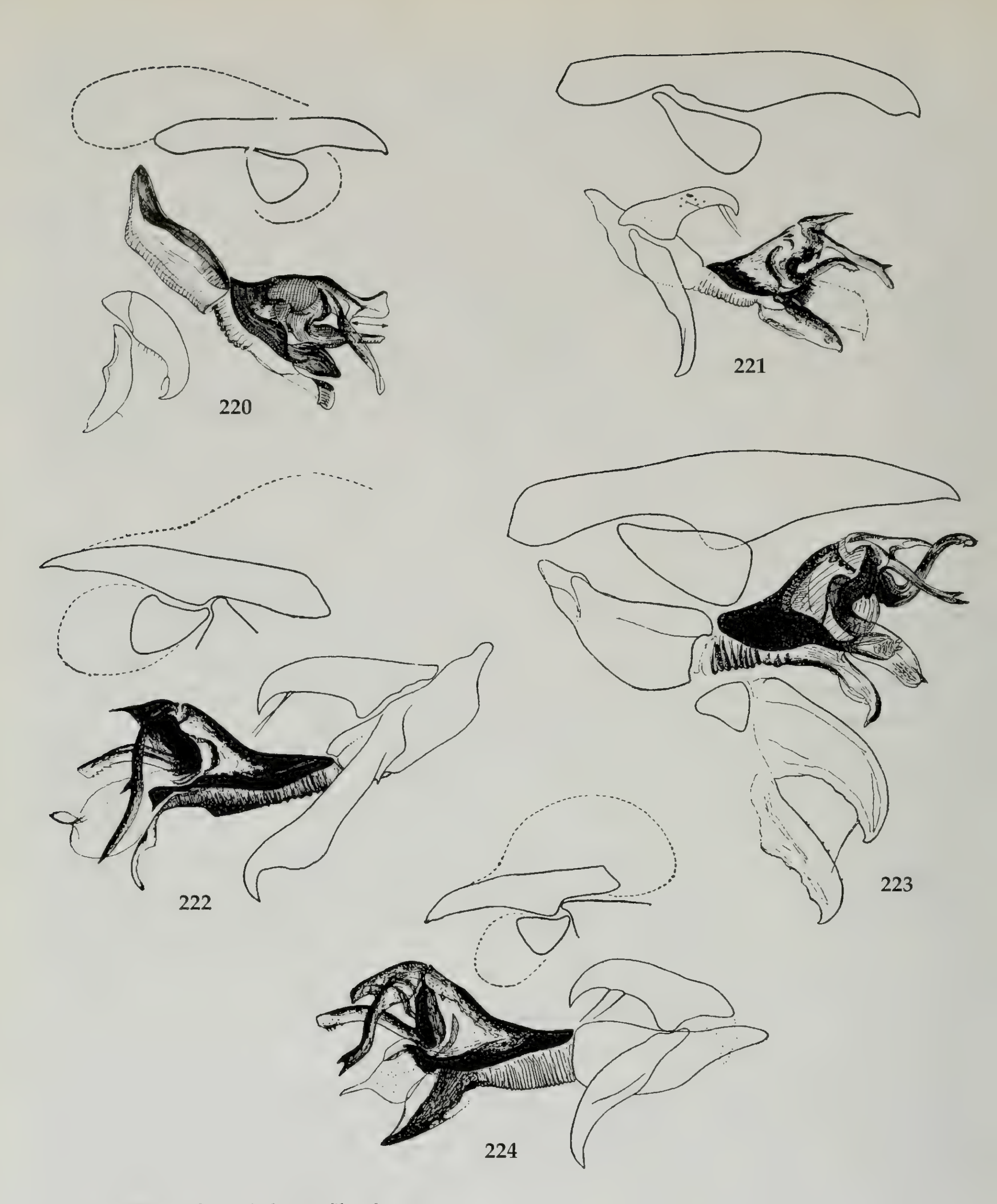
– Pregonite gradually tapering, dorsal spine of lateral arms situated preapically (Fig. 223) ............. ...................................................................................................... L. (s. str.) *pleskei* (Rohdendorf)

### Subgenus *Curranea* Rohdendorf, 1937

Fauna SSSR 19 (1): 255.
**Type species:** *Sarcophaga beckeri* Villeneuve, 1908 (syn. of *Sarcophaga tibialis* Macquart, 1850).

Light grey flies, medium-sized to big. ♂ abdominal sternite IV shortly haired, apical plate perpendicular to longitudinal phallus axis and having long and narrow lateral arms; paraphallus elongate, ventral lobes small, harpes absent, one pair of membranal processes, stylus long and narrow. ♀ VI abdominal tergite bilobate or membranous dorsally, VIII tergite very small, in form of 2 lateral plates, but distinct.

Larvae schizophagous. 4 species – two Oriental – *L. iwuensis* (Ho) and *L. kalimpongensis* (Nandi); one from Oceania – *L. raiateai* (Salem); and *L. tibialis* (Macq.) in Afrotropical region expanding to warm habitats of Palaearctic region.




**Figs. 220.-224.** Male genitalia profile of:
**Fig. 220.** *Liosarcophaga teretirostris*
**Fig. 221.** *Liosarcophaga harpax*
**Fig. 222.** *Liosarcophaga portschinskyi*
**Fig. 223.** *Liosarcophaga pleskei*
**Fig. 224.** *Liosarcophaga jacobsoni*

### *Liosarcophaga (Curranea) tibialis* (Macquart, 1850)

Mém. Soc. Sci. Agr. Lille (1850): 232 *(Sarcophaga).*

*Sarcophaga beckeri* Villeneuve, 1908. Mitt. Zool. Mus. Berl. 4: 122.

**Description**

♂. Frons at narrowest part 0.19-0.22, at vertex 0.22-0.26 and at antennal base 0.32-0.4 head width. Frontal vitta 1.4-2 times wider frontoventrally, frons middle 1.7-2.5 times wider than one parafrontal; 3rd antennomere 1.7-2.3 times longer than 2nd. Parafacial at antennal base 0.14-0.2 and gena 0.16-0.28 eye heigth. Palpus long, distinctly widening apically; 1-2 rows of postorbital setae, vte distinct, ocellar bristles strong; fr 10-14, long and strong, crossed; parafacial with 1-3 irregular rows of delicate bristles and hairs, lower 0.3-0.5 of facial ridge densely short black setose; ac 0+1, weak. Ctenidium present, all femora and hind tibia with numerous dense and long ventral hairs, hind femora with 4-8 strong av-bristles. Costal spine very small, often indistinct, m-vein acute- or right-angled, m-cu vein sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.7; abdominal tergite III without mediomarginals, segment VII+VIII without mediomarginals but densely haired. Cercus profile medium width, moderately curved ventrally, narrowing and pointed apically, with a small apical hooklet. Pregonite short and broad, almost straight, apex pointed with several dorsal setae, postgonite as long as pregonite and almost straight, apically pointed, 2-3 ventral bristles; membranal lobe elongate and protruding, moderately broad, narrowing and curved apically, paraphallus elongate, ventral lobe poorly developed, apical plate long and narrow, apically obtuse, with a pair of bristle-like lateral arms, stylus long and narrow, bristle-like, nearly straight (Fig. 217).

Body ground coloration grey (not very dark). Head silvery grey dusted, frontal vitta, antenna and palpus black. Thorax grey dusted, longitudinal mesothoracic striae well marked, legs black, wings hyaline, abdomen chequered. Segment VII+VIII brownish red to brownish black, white pollinose, epandrium lustrous red or yellowish red.

♀. Frons at narrowest part 0.29-0.33 head width, frontal vitta parallel-sided, 1.3-1.5 times broader than parafrontal; mid-femoral organ elongate, distinct and reddish; abdominal tergite VI consisting of broad, large lateral plates, each with numerous marginal hairy bristles; tergites VII and VIII distinct, each consisting of two plates, naked; tergite VII large and membranous; tergite VIII diminutive, but distinctly sclerotized. Genitalia red or reddish.

Body length in both sexes 8-17 mm.

**Distribution:** Afrotropical region including Madagascar; North Africa, entire Mediterranean, Balkan countries, Italy, France and Spain, reaching Hungary in central Europe. A thermophilic and heliophilic species tending towards culturophily and synanthropy. Ecology: Larvae develop in carcasses and are parasitoids of locusts (e.g. *Dociostaurus maroccanus, Schistocerca gregaria,* some may participate on mammal myiases (Villeneuve 1922, Delassus 1929, Zumpt 1972, Disney 1973, Beaver 1986).

## Subgenus *Liosarcophaga* s. str.

Grey flies of various size. ♂ with abdominal tergite IV haired, one pair of membranal lobes, harpe absent, apical plate situated in longitudinal axis of distiphallus, lateral arms longer than medial part of apical plate. ♀ with abdominal tergite VI usually bilobate or at least membranous dorsally. Tergite VII and VIII more or less distinct, but withdrawing and membranous. More than 60 species; 8 species in central Europe.

### *Liosarcophaga* (s. str.) *aegyptica* (Salem, 1935)

Publ. Egypt. Univ., Fac. Medic. 5: 56 *(Sarcophaga dux* var. *aegyptica).*

*Parasarcophaga (Liosarcophaga) parkeri* Rohdendorf, 1937. Fauna SSSR 19 (1): 217.

**Description**

♂. Frons at narrowest part 0.19-0.22, at vertex 0.24-0.27 and at antennal base 0.32-0.43 head width. Frontal vitta 1.4-2.2 times wider frontoventrally, frons at middle 1.2-2.5 times wider than parafrontal; 3rd antennomere 1.6-2.5 times longer than 2nd. Parafacial at level of antennal base 0.16-0.25 and gena 0.16-0.31 eye height. Palpus long, apically moderately widening; two rows of postorbital setae, vte indistinct; fr 8-13, long and strong, crossed; parafacial with 1-2 vertical rows of short setae; gena white setose, only its fore part with few black hairs; lower 0.2-0.4 of facial ridge finely haired; ac 0+1, not very strong; scutellum with ap crossed and one pair of d. Ctenidium well developed, all femora and hind tibia with long dorsoventral hairs, $f_3$ with a row of strong av. Costal spine small and indistinct, m-vein right-angled, m-cu vein strongly sigmoid, ratio between 3rd and 5th costal sections 1 : 0.5-0.8. Abdominal tergite III without medio-marginals; sternite V without "brush". Segments VII+VIII square, without marginals. Cercus profile broad, almost straight, apex spinose pointed. Pregonite long, moderately curved, apically widening and pointed, postgonite with broad basis, narrowing and hooklet-shaped apically; membranal lobe elongate, well sclerotized, apex obtuse; ventral lobes elongate, apically pointed, as wide or somewhat narrower than membranal lobe; apical plate very short, lateral srms straight, pointed apically, not bifurcate; stylus narrow, moderately long, slightly curved (Fig. 218).

Body ground coloration dark grey. Head silvery white or silvery yellow dusted, frontal vitta, antenna and palpus black, 2nd antennomere often brownish; thorax grey pollinose, longitudinal mesonotal stripes brownish black to black, broad, legs black, wings hyaline, abdominal checquered pattern pale or dark. Segment VII+VIII black or brown, densely grey dusted, epandrium lustrous red or orange.

♀. Frons at narrowest part 0.31-0.35 of head width, frontal vitta nearly parallel-sided; mid-femoral organ long and large, reddish or brownish, well develped; abdominal tergite VI complete, moderately membranous centrally, with numerous medium-length marginal bristles and shortly haired; tergites VII and VIII small, membranous, complete and bare, tergite VII distinctly smaller than VIII; sternite VII with distinct posterior cavity and one pair of marginals. Genitalia reddish.

Body length 6.5-14.5 mm.

**Distribution:** Afrotropical region, eastern Mediterranean, Balkan countries, southern Ukraine and Russia, Transcaucasia, central Asia up to Kazkhstan and northwestern China, Near and Middle East, in central Europe reaching Hungary and southern Slovakia (rare in lowground xeric habitats). A thermosphilic species. Larvae develop in (small) animal carcasses and are predators of coprophagous maggots of muscoid flies in (human) faeces (Rohdendorf 1937, Drensky 1957, Trofimov 1969, Sychevskaya 1972, and own observation); bred from the beetles *Pisterotarsa gigantea zoubkoffi* and *Scarabeus sacer* (Charykuliev & Nepesova 1972), participating in sheep cutaneous myiasis (Trofimov 1957). The species appears to be culturophile and synanthropic in subtropical and tropical habitats, but is endangered in its northern distributional limits, representing there a very sensitive taxon and an indicator of undisturbed xeric habitats.

**Parasites of pupae:** Chalcididae (*Brachymeria minuta*), Pteromalidae (*Mormoniella vitripennis*), Figitidae (*Figites sarcophagorum*), Eucoliidae (*Eucolia trichopsila*) (Sychevskaya 1964).

### *Liosarcophaga* (s. str.) *emdeni* (Rohdendorf, 1969)

Ent. Obozr. 48: 946 *(Parasarcophaga)*.

*Parasarcophaga teretirostris* sensu Rohdendorf, 1937. Fauna SSSR 19 (1): 205 (misidentification, nec *Sarcophaga teretirostris* Pandellé, 1896).

**Description**

♂. Frons at narrowest part 0.18-0.24, at vertex 0.22-0.27 and at antennal base 0.32-0.40 head width; frontal vitta 1.4-2.2 times wider frontoventrally, frons middle 1.5-2 times wider than parafrontal; 3rd antennomere 1.6-2.3 times longer than 2nd. Parafacial at level of antennal base 0.17-0.27 and gena 0.2-0.33 eye height; palpus long, apex distictly inflated; 1-3 rows of postorbital setae, vte indistinct, fr 7-13, not very strong, crossed; parafacial setae forming 1-3 indistinct rows, shorter than parafacial width; facial ridge at lower 0.4-0.5 dense and short blackish bristled; ac 0+1, strong. Scutellar ap

crossed, one pair of d bristles. Ctenidium well developed, all femora and hind tibia with a row of long pv. Costal spine very small, indistinct, m-vein right-angled, m-cu vein strongly sigmoid, ratio between 3rd and 5th costal sections 1 : 0.5-0.9. Abdominal tergite III without mediomarginals, sternite V slightly keeled, "brush" poorly developed. Cercus nearly straight, apically pointed. Segment VII+VIII square, without marginals; pregonite almost straight, narrow, apically pointed; postgonite distinctly curved, base inflated, hook-shaped, 2 ventral bristles; membranal lobe elongate, moderately wide, obtuse apically, poorly sclerotized; ventral lobe short, obtuse, well sclerotized; apical plate elongate, membranous and deeply bilobate, lateral arms almost straight, apically obtuse, not bilobate; stylus narrow mid-length, sigmoid (Fig. 219).

Body ground coloration deeply grey, head silvery whitish or yellow whitish grey dusted, frontal vitta, antenna and palpus black; thorax blackish, grey pollinose, longitudinal mesonotal stripes black, broad and distinct, wings hyaline, legs black, abdominal pattern deeply grey and blackish, chequered; genital segments black, segments VII+VIII pale dusted; epandrium lustrous.

♀. Frons at narrowest part 0.3-0.34 head width; mid-femoral organ large, elongate, reddish; abdominal tergite VI dorsally interrupted, each lateral lobe with 1-2 rows of strong marginals and with numerous short setae. Tergite VII membranous, in form of quadrate plate more or less interrupted medially; tergite VIII in form of a pair of membranous, broadly separated plates. Genitalia black.

Body length in both sexes 6.5-14 mm.

**Distribution:** Eastern Austria, Bohemia, Moravia, Slovakia, Poland northwards to southern Finland, Sweden, southern Norway and Denmark, eastern Germany, Balkan peninsula and eastwards through Ukraine and Russia to Caucasus slopes, Kazakhstan, Siberia to Lake Baikal and northwestern China.

**Comments:** The species vicariates with the closely related *Liosarcophaga* (s. str.) *teretirostris* (Pandellé 1896) (Fig. 220) distributed in western Europe and differring mainly by essentially shorter tip of apical plate in the ♂.

**Ecology:** Larvae are necrophygous and facultative parasitoids of lepidopterous bombycoid larvae, especially Lymantriidae (*L. dispar* and *L. monacha* – see Khicova 1967, Trofimov 1969), snails (*Helicella obvia* – Verves & Kuzmovich 1979). Flies were reared from *Helix nemoralis* (Richet 1990). It accompanies lower elevations, both lowland forests and xeric habitats and is obviously rather thermophilic.

### *Liosarcophaga* (s. str.) *harpax* (Pandellé, 1896)

Revue Ent. 15: 189 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.21-0.26, at vertex 0.23-0.29 and at antennal base 0.34-0.52 head width; frontal vitta 1.1-1.5 times wider frontoventrally, frons middle 2.5-4 times wider than parafrontal; parafacial at antennal base 0.17-0.23 and gena 0.24-0.35 eye height; palpus long, apex moderately inflated; one regular row of postorbital setulae; vte indistinct; fr 9-13, strong and crossed; one or two rows of parafacial setulae, longest of them shorter than paarafacial width; facial ridge at lower 0.4-0.6 short bristled; ac 0+1, distinct; scutellum with one pair of ap and d; ctenidium distinct, all femora and hind tibia with numerous long ventral hairs, $f_3$ with a row of strong av, $t_3$ with numerous long av and pr; costal spine minor or absent, ratio between 3rd and 5th costal sections 1 : 0.5-0.7, m-cu vein more or less sigmoid; abdominal tergite III without mediomarginals; segment VII+VIII moderately prolonged, without marginals; sternite V with poorly developed "brush" and with moderately long marginal bristles; cercus profile broad, moderately curved ventrally, apex short hooklet-shaped, subterminally with protuberance; pregonite elongate, almost straight, narrow, apically pointed; postgonite hook-shaped, with two ventral bristles; membranal and ventral lobes of same length and width, medium-sclerotized and pointed; apical plate very short, spinose, lateral arms almost straight, with elongate preapical ventral appendix, stylus mid-lenth, narrow, strongly sigmoid (Fig. 221).

Body dark grey; head golden or silvery white pruinescent, frontal vitta, antenna and palpus black; thorax grey or yellowish grey dusted, blackish mesonotal stripes distinct, legs black; wings hyaline, abdomen with chequered pattern, genitalia lustrous black, segment VII+VIII often brownish, grey dusted.

♀. Frons at narrowest part 0.32-0.35 head width; mid-femoral organ large, reddish or blackish, sometimes less distinct; abdominal tergite VI bilobate, each lobe with a row of strong marginal bristles and with numerous short setae; tergite VII consisting of two rounded, poorly separated, bare and membranous plates; tergite VIII membranous, complete, annulate; genitalia black.

Body length in both sexes 8-16 mm.

**Distribution:** Holarctic, partly in Oriental region. The species accompanies mostly deciduous forests at lower elevations, and is uncommon in the higher coniferous zone.

**Ecology:** Larvae develop as parasitoids of arthropods, mainly insects, but may avoid as predators of fly maggots in animal carcasses and occasionally cause myiasis (Kano et al. 1967, Artamonov 1987, 1988). Larvae were found to parasitize pupae of Lepidoptera: *Aporia crataegi, Dasychira albodentata, Dendrolimus pini, D. sibiricus, D. spectabilis, Dictyoploca japonica, Lymantria dispar, L. monacha, Stilpnotia salicis* (e.g. Rohdendorf 1937, Shapiro 1956, Ryvkin 1958, Kolomyiec 1958, 1966, Girfanova 1962, Ishijima 1967, Khitzova 1967, Entin 1971, Nakonechnyi, Ivliev & Jazchenkov 1973, Artamonov 1978, 1983, 1985, Fan 1992 etc.). Parasitoids of puparia: Braconidae (*Dibrachus cavus*), Bombyliidae (*Anthrax morio, A. velutina*) (Ryvkin 1958).

### *Liosarcophaga* (s.str.) *jacobsoni* (Rohdendorf, 1937)

Fauna SSSR 19 (1): 220 (*Parasarcophaga*).

*sachtlebeni* Lehrer, 1959 (*Parasarcophaga*). Beitr. Ent. 9 (7-8): 903.

**Description**

♂. Frons at narrowest part 0.22-0.26, at vertex 0.23-0.29 and at antennal base 0.3-0.44 head width; frontal vitta 1.5-2.3 times wider frontoventrally, frons middle 1.8-3 times wider than parafrontal; 3rd antennomere 1.8-2.3 times longer than 2nd. Parafacial at antennal base 0.2-0.32 and gena 0.18-0.35 eye height; 2 rows of postorbital setulae, vte indistinct or very short; fr 9-13, strong and crossed, 1-2 rows of parafacial setulae, longest shorter than parafacial width; facial ridge at lower 0.3-0.4 short bristled; palpus long, apex distinctly inflated; ac 0+1, both delicate or well developed; scutellum with a pair of ap and d; ctenidium distinct, all femora and hind tibia with long, dense ventral hairs, $f_3$ with a row of 9-12 av, $t_3$ with a row of elongate pv; costal spine delicate, m-cu vein more or less sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.9; abdominal tergite III without mediomarginals; sternite V distinctly keeled, without "brush", with several long hind marginal hairy bristles; segment VII+VIII square, without marginals. Pregonite moderately curved, pointed, postgonite almost same length as pregonite, broad, hook-shaped, with 2-3 ventral bristles. Membranal lobes protruding, well sclerotized, moderately broad, apically pointed and curved; ventral lobes wider than membranal lobes, poorly sclerotized, with apical spine; apical plate elongate and narrow, pointed awl-shaped, lateral arms sigmoid, apically bifurcate, stylus medium-length, narrow, sigmoid (Plate X, Fig. 4, Fig. 224).

Body pale grey, head densely yellowish grey or silvery white pollinose; frontal vitta, antenna and palpus black, legs black, wings hyaline, abdomen with bright (sometimes dark) chequered pattern; segment VII+VIII brownish red to blackish, slightly grey dusted, epandrium reddish, occasionally blackish brown, lustrous.

♀. Frons at narrowest part 0.29-0.33 head width; mid-femoral organ large, elongate, reddish or brownish; tergite VI complete with strong marginals, tergites VII and VIII absent. Genitalia red.

Body length 6.5-14 mm.

**Distribution:** Mediterranean region to southern Ukraine and southern Russia, Transcaucasia, central Asia, Mongolia, northern China, Korea. The species reaches central Europe in Hungary and southern Slovakia, is rather heliophilic. It attains considerable densities along the sea shores of the British Channel, in northern Germany and Denmark as a culturophile, partly synanthropic species. It reattacks carcasses and is predatory on fly maggots in faeces, and a typical scavenger (Drensky 1957, Trofimov 1969, Sychevskaya 1972, Artamonov 1987). It is a passive vector of protozoan cysts, e.g. *Bodo caudata, Lamblia intestinalis, Herpetomonas muscorum* (Trofimov & Engelhardt 1965). Flies were reared from *Helix nemoralis* (Richet 1990).

### *Liosarcophaga* (s. str.) *pleskei* (Rohdendorf, 1937)

Fauna SSSR 19 (1): 231 *(Parasarcophaga).*

*Sarcophaga tuberosa verticina* Ringdahl, 1945. Opusc. ent. 10: 35.

**Description**

♂. Frons at narrowest part 0.21-0.22, at vertex 0.26-0.29 and at antennal base 0.37-0.4 head width; frontal vitta 1.1-1.5 times wider frontoventrally, frons middle 2.5-3.5 times wider than parafrontal; 3rd antennomere 1.7-2.5 times longer than 2nd. Parafacial at level of antennal base 0.17-0.31 and gena 0.25-0.36 eye height; palpus long, apically distinctly inflated; 2-3 rows of postorbital setae, vte indistinct; fr 8-13, strong and crossed; 1-2 rows of parafacial bristles, longest of them corresponding to parafacial width, facial ridge setose at lower 0.4-0.5; ac 0+1, strong; scutellum with ap and one pair of d; ctenidium poorly developed, all femora and hind tibia with long dense ventral hairs, $f_3$ with a row of 7-12 strong av. Costal spine small or indistinct, m-cu vein more or less sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.8. Abdominal tergite III without marginals, sternite V with more or less distinct "brush" and with long hind hairs, base distinctly convex but not sharply keeled, and with a distinct angular profile. Segment VII+VIII short, without marginals; pregonite gradually tapering, postgonite almost as long as pregonite, cercus profile moderately broad, apex pointed, moderately curved ventrally; distal part of membranal process very narrow, hook-shaped, base medium-width, ventral process distinctly broader than membranal process, apically pointed; apical plate narrow, medium-length and pointed, lateral arms almost straight, tip bifurcate; stylus elongate, almost straight, widening apically, reaching tips of lateral arms (Fig. 223).

Body dark grey, head golden yellow or whitish grey dusted; frontal vitta, antenna and palpus black, thorax grey dusted, longitudinal mesonotal stripes distinct, black, legs black, wings hyaline, abdominal chequered pattern dark grey, genitalia black. Segment VII+VIII moderately pale dusted, epandrium lustrous.

♀ unknown.

Body length 7.5-14.5 mm.

**Distribution:** A Holarctic boreomontane taxon known from Norway, Sweden, Switzerland, Austria, Russia (north Caucasus, Siberia, north and central Far East), Georgia, Kirgizia, Tadjikistan, Mongolia, northwestern China and Canada. Larvae are necrophagous (Artamonov 1987).

### *Liosarcophaga* (s. str.) *portschinskyi* (Rohdendorf, 1937)

Fauna SSSR 19 (1): 226 *(Parasarcophaga).*

**Description**

♂. Frons at narrowest part 0.2-0.25, at vertex 0.22-0.29 and at antennal base 0.35-0.41 head width; frontal vitta 1.2-1.6 times wider frontoventrally, frons middle 1.2-2.5 times wider than parafrontal; 3rd antennomere 1.8-2.3 times longer than 2nd; parafacial at level of antennal base 0.18-0.22 and gena 0.21-0.32 eye height; palpus long, apically well dilated; 2-3 rows of postorbital setulae, vte indistinct; fr 7-13, not very strong, at fore frontal part crossed; 1-2 rows of parafacial bristles, longest 0.5-0.6 of parafacial width; facial ridge in lower 0.4-0.5 shortly haired; ac 0+1, strong; scutellum with crossed ap and one pair of discals. Ctenidium formed by short bristles; all femora and hind tibia with long ventral hairs; $f_2$ with a complete row of av and apical row of pv, $f_3$ with apical row of av, $t_3$ with a row of long pv; costal spine small or indistinct, m-cu vein more or less sigmoid, ratio between 3rd and 5th costal sections 1 : 0.5-0.7; abdominal tergite III without mediomarginals, segment VII+VIII square, without marginal bristles; pregonite elongate, broad, distinctly sigmoid, apically sickle-shaped, dorsally haired, postgonite distinctly shorter, almost straight, pointed apically; cercus almost straight, pointed apically; membranal lobe elongate, partly membraneous, apex curved basally and pointed, distinctly narrower than membranous ventral lobe; apical plate very short, with long lateral arms, their dorsal spine (bifurcation) in proximal 0.3-0.4; stylus sigmoid, shorter than tip of lateral arms (Plate X, Fig. 1, Fig. 222).

Body ground coloration dark grey; head silvery grey to yellowish white dusted; frontal vitta,

antenna and palpus black; thorax grey dusted, dark grey with longitudinal mesonotal stripes distinct; legs black, wings hyaline; abdominal chequered pattern dark; genitalia lustrous black, segment VII+VIII distinctly grey pollinose laterally.

♀. Frons at narrowest part 0.32-0.35 head width; mid-femoral organ large, reddish or brownish; abdominal tergite VI bilobate, with strong dense marginal bristles and otherwise very shortly haired; tergite VII small, square, membranous and bare; terminalia black, sometimes with reddish hue.

Body length 7-15 mm.

**Distribution:** Europe except British Isles (reaching Arctic Circle in Sweden and Karelia), Transcaucasia, southern Siberia, Asia Minor, central Asia, Far East, Mongolia and China.

The species tends towards culturophily preferring dry to xeric habitats and warm lowland (deciduous) forests. Adults feed on decomposing substrates, flowers etc. Larvae are predators of muscoid maggots in faeces, animal carcasses etc. (Trofimov 1969, Zhang 1982, Artamonov 1987); flies were bred from pupae of the moth *Lymantria dispar* (Girgfanova 1962) and from grass snake (Pape 1987).

## *Liosarcophaga* (s. str.) *teretirostris* (Pandellé, 1896)

Revue ent. 15: 190 *(Sarcophaga)*.

*Parasarcophaga kroeberi* Rohdendorf, 1937. Fauna SSSR 19 (1): 211.
*Parasarcophaga decellei* Lehrer, 1976. Annot. zool.-bot. Bratislava 115: 3.

**Description**

♂. Frons at narrowest part 0.2-0.22, at vertex 0.23-0.25 and at antennal base 0.37-0.4 head width. Frontal vitta 1.3-1.6 times wider frontoventrally, frons at middle 2-3 times wider than parafrontal; 3rd antennomere 1.7-2.7 times longer than 2nd; parafacial at antennal base 0.17-0.22 and gena 0.25-0.37 eye height. Palpus long, apex inflated; 2-3 rows of postorbital setulae, vte indistinct; fr 10-14, crossed; 1-2 rows of parafacial bristles, longest of them shorter than parafacial width, facial ridge haired at lower 0.4-0.5; ac 0+1, delicate. Scutellum with paired ap and d. Ctenidium consists of short bristles, all femora and hind tibia with dense ventral hairs, $f_3$ with 6-8 strong av, $t_3$ with few long av and pv. Costal spine indistinct, m-cu vein sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.7; abdominal tergite III without mediomarginals; segment VII+VIII moderately elongate, without marginal bristles. Cercus profile broad, almost straight, apically pointed; pregonite elongate and narrow, disnctictly curved, apex obtuse, postgonite shorter, broad and spine-like; membranal lobes straight, poorly sclerotized, medium-width, apically rounded, ventral lobes well sclerotized, short, stick-like; apical plate medium-length, widening and not separated longitudinally, apex obtuse, with almost straight lateral arms without preapical spines; stylus broad medium-length, sigmoid, apex pointed (Fig. 220).

Ground coloration dark grey, head yellowish grey to whitish grey dusted, frontal vitta, antenna and palpus black, thorax black, grey pollinose, longitudinal mesonotal stripes blackish, legs black, wings hyaline, abdomen with usual chequered pattern, genitalia lustrous black, segment VII+VIII moderately pale pollinose.

♀ unknown.

Body length 7-13.5 mm.

**Distribution:** Western Europe including Great Britain and Ireland, France, Italy, Spain, Switzerland, western Austria, western and southern Germany.

**Ecology:** Larvae develop in decaying flesh and meat, animal carcasses, and are parazitoids of snails *Helicella candicans* (Lopes 1940), *Helix lactea* (Séguy, 1941a, Beaver 1973).

**Comments.** The species vicariates with its sibling *Liosarcophaga emdeni* (Rohd.) (Fig. 219) as its western counterpart; but the geographical demarcation of the two taxa in central Europe is unclear.

## *Liosarcophaga* (s. str.) *tuberosa* (Pandellé, 1896)

Revue ent. 15: 192 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.19-0.24, at vertex 0.22-0.28 and at antennal base 0.34-0.43 head width; frontal vitta 1.3-2 times wider frontoventrally, frons middle 1.5-3 times wider than parafrontal. 3rd antennomere 1.5-2.1 times longer than 2nd. Parafacial at level of antennal base 0.17-0.24 and gena 0.26-0.3 eye height. Palpus long, apex distinctly inflated; 1-3 rows of postorbital setulae, vte absent; fr 8-13, strong and crossed; 2-3 rows of parafacials, longest distinctly shorter than parafacial width; facial ridge shortly haired at lower 0.3-0.5; ac 0+1, strong; scutellum with crossed ap and one pair d; ctenidium well developed, all femora and hind tibia densely long haired, $f_3$ with a row of long and strong av, $t_3$ with numerous long av and pv; costal spine small or absent, m-cu vein sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.8; abdominal tergite III without mediomarginals. Sternite V without "brush", with moderately long marginals, segment VII+VIII moderately elongate, without marginals; cercus profile slender, apical part distinctly sigmoid with tip pointed. Pregonite long and narrow, apex pointed, postogonites distinctly shorter, broadly foliate with tip short hooklet-shaped; membranal lobes elongate, nearly straight, apex pointed, distinctly narrower and longer than ventral lobes, well sclerotized; ventral lobes broad and shorter, weakly sclerotized, with short apical spine; apical plate medium-length and narrow, pointed, lateral arms more or less sigmoid, apex shortly bifurcate; stylus distinctly concave, not very thin, apically rounded (Fig. 225).

Ground coloration dark grey, head densely golden or yellowish white dusted, frontal vitta, antenna and palpus black; thorax black, grey pollinose, longitudinal mesonotal stripes blackish, distinct; legs black, wings hyaline, abdomen as usual with dark chequered pattern; genitalia lustrous black, segment VII+VIII pale dusted.

♀. Frons at narrowest part 0.32-0.35 head width, frontal vitta 1-1.5 times wider than parafacial; mid-femoral organ large, distinctly elongate, reddish to brownish; tergite VI bilobate with numerous marginal bristles, tergite VII complete, with a row of setae, sternite VII with short marginal hairs; genitalia black or brownish black.

Body length 6-16 mm.

**Distribution:** Widely distributed throughout the Palaearctic region, reaching northern Germany, Poland and St Petersbourgh; Russia and extending into North America; in the south entering the Oriental region. It is a forest species accompanying especially warm deciduous, undisturbed stands at lower elevations. Flies visit flowers, ripe fruits and decaying substrates. Larvae are facultative parasitoids of lepidopterous bombycoid pupae, e.g.: *Lymantria dispar, L. monacha, Dendrolimus pini* (Shapiro 1956, Khitzova 1967, Artamonov 1985, Baer 1921 etc.) but may also develop in other insects and in snails (Rohdendorf 1937, Artamonov 1987), and James (1947) mentions their participation in cutaneous myiasis.

**Comments.** *Liosarcophaga tuberosa* offers a characteristic example of anthropophobic species sensitively reacting to environmental change gradually withdrawing from western and central Europe together with some other taxa of *Liosarcophaga* and generally in company with forest-bound species of Sarcophagini.

## Subgenus *Pandelleisca* Rohdendorf, 1937

Fauna SSSR 19 (1): 238.
**Type species:** *Sarcophaga similis* Meade, 1876.

Grey, medium-sizd to big flies, $r_1$ bare, parafacial bristles short or medium-length, shorter than parafacial width. ♂ abdominal sternite IV shortly haired, sternite V with "brush", cercus without spines, two pairs of long, narrow, pointed membranal lobes, harpes absent, ventral lobe elongate, apical plate short with a pair of elongate lateral arms, stylus long and narrow. ♀ mid-femoral organ large and long, reddish or brownish; abdominal tergite VI divided into a pair of lateral plates with long marginal bristles, tergite VII well developed, large, short and wide, membranous; sternite VI wide but

short. 10 species in Palaearctic and Oriental regions; one central European apecies. Larvae are schizophagous.

**References:** Kano, Field & Shinonaga 1967; Fauna japon. (Sarcophagidae): 63-69.

### *Liosarcophaga (Pandelleisca) similis* (Meade, 1876)

Ent. Month. Mag. 12: 268 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.17-0.23, at vertex 0.18-0.29 and at antennal base 0.35-0.39 head width; frontal vitta 1.3-1.7 times widening frontoventrally, frons middle 1.3-2.3 times wider than parafrontal; 3rd antennomere 1.7-2.5 times longer than 2nd; parafaciale at antennal base 0.8-0.26 and gena 0.23-0.35 eye height. Palpus long, apically inflated; 1-3 rows of postorbital setulae, vte distinct; fr 9-14, lower 3-4 pairs divergent; 1-2 rows of parafacials, longest of them distinctly shorter than parafacial width; facial ridge shortly haired at lower 0.4-0.5; ac 0+1, rather strong; scutellum with crossed ap and with one pair of discals; ctenidium poorly developed; all femora and hind tibia with long ventral hairs; $f_2$ with a complete row of av and one apical row of slightly elongate pv; costal spine small or indistinct, m-cu vein more or less sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.9; abdominal tergite III without mediomarginals; segment VII+VIII moderately elongate, without marginal bristles; cercus profile mid-broad, narrowing apically, slightly concave ventrally, claw-shaped; pregonite moderately wide, regularly curved ventrally, pointed apically, with dorsal setae; postgonite shorter than pregonite, hook-shaped, with 2 ventral bristles; basal pair of membranal lobes distinctly longer than distal; apical plate broad, membranous, its lateral arms slender, not bifurcate, tapering towards membranal lobes, but distinctly curved apically; medial process very large, situated under apical plate with tip protruding in form of a distinct sclerotized spine under apical plate margin; stylus very narrow, moderately sigmoid and not very long (Plate X, Fig. 5, Fig. 226).

Body ground coloration dark grey; head with silvery or golden pruinescence, antenna and frontal vitta black, palpus brownish to black; thorax silvery to golden dusted, mesonotal longitudinal stripes black, distinct; legs black, wings hyaline, abdominal chequered pattern silvery grey; genitalia lustrous black, segment VII+VIII greyish pruinescent.

♀. Frons at narrowest part 0.3-0.34 of head width, mid-femoral organ large; tergite VI divided, the halves videly separated, with long marginals and mid-length hairs; tergite VII membranous, medium-sized, tergite VIII divided into a pair of very small membranous sclerites without membranous connection. Genitalia black.

Body length 7-15 mm.

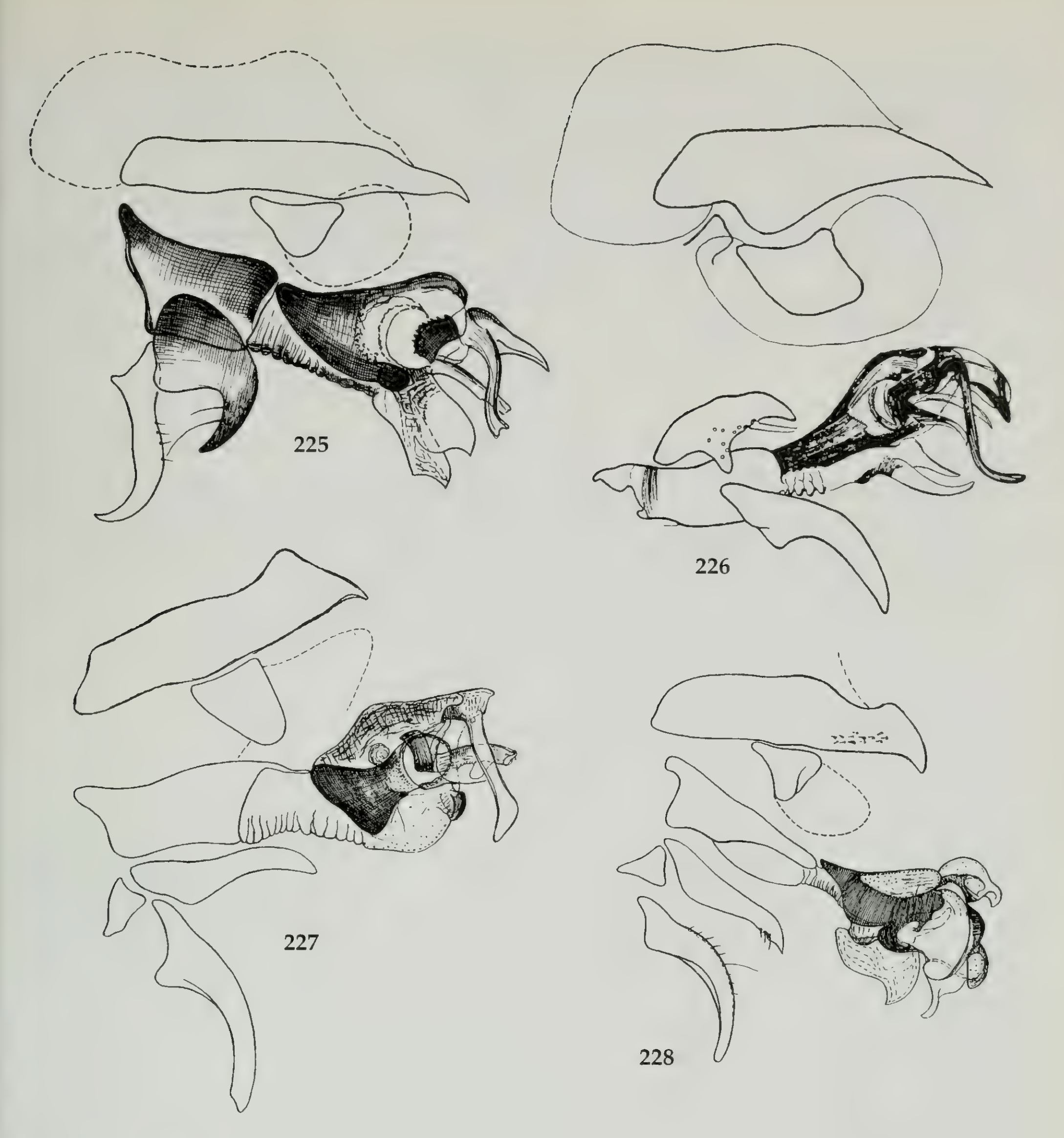
**Distribution:** Widely distributed across the Palaearctic and Oriental regions, but avoiding forestless territories (e.g. North Africa and central Asia) and accompanying entire forest zone from the British Isles to Japan. Flies are locally common (but withdrawing from western and Central Europe) in mesophytic forest habitats feeding at flowers and on decaying substrates. The species is necrophagous, coprophagous and a parasitoid of noctuid and bombycoid moths (e.g. *Lacanobia oleracea* – Tiensuu 1939), succineid snails (Artamonov 1983), and other invertebrates (Rohdendorf 1937, Mihályi 1964, Kirchberg 1954, Artamonov 1967, Kano et al. 1967 etc.) and is involved in myiasis in man (James 1947, Kano et al. 1967, Park 1977).

**Pupal parastitoids:** Braconidae (*Alysia manducator* and *Aphaereta minuta* (Zinovyeva & Vinogradova 1972).

### Genus *Liopygia* Enderlein, 1928

Arch. klassif. Phylogen. Ent. 1 (1): 41.
**Type species:** *Musca ruficornis* Fabricius, 1794.

Grey flies, medium-sized to large. Parafacial bristles distinctly shorter than parafacial width; occiput, postgena and partly gena with white hairs. Propleuron bare. $R_5$ open, $r_1$ bare; abdominal tergite III




**Figs. 225.-228.** Male genitalia profile of:
**Fig. 225.** *Liosarcophaga tuberosa*
**Fig. 226.** *Liosarcophaga similis*
**Fig. 227.** *Liopygia crassipalpis* (*securifera* auct.)
**Fig. 228.** *Liopygia argyrostoma* (*barbata* auct.)

without mediomarginals; ac 0+1, rather weak; all ♂ femora and hind tibia with long and dense ventral hairs; abdominal sternite IV with short setulae; stylus elongate, proportionally widening with membranous spiral "envelope", often with short spinose apical bristles; lateral arms of distiphallus apical plate elongate, apex more or less widened; harpe absent. ♀ mid-femora with femoral organ large and elongate, reddish to brownish; abdominal tergites VII-X entirely reduced.

5 subgenera (*Engelisca* Rohdendorf, *Jantia* Rohdendorf, *Liopygia* s. str., *Thomsonea* Rohdendorf and *Varirosellea* Hsue), comprising 8 species in different zoogeographical regions; 3 subgenera and 3 species in central Europe; larvae schizophagous, some are predators of lepidopterous pupae.

### Key to subgenera and species of *Liopygia*

1. Cercus apically spinose; ventral processes poorly separated from paraphallus (subg. *Thomsonea* Rohd.); lateral arms of apical plate spatulate (Fig. 228) ............................. *L. (T.) argyrostoma* (R.-D.)
– Cercus apically not spinolate, only with bristles; ventral processes distinctly separated from paraphallus ........................................................................................................................................ 2.
2. Cercus with longitudinal furrow and dorsal tuft of erect hairs apically, without distinct dorsal inflation (Fig. 230). Epandrium black (subg. *Varirosellea* Hs.) ........................... *L. (V.) uliginosa* (Kr.)
– Cercus without longitudinal furrow and without dorsal hairs-tuft, with distinct apical inflation (subg. *Jantia* Rohd.) (Fig. 227); epandrium red ............................................... *L. (J.) crassipalpis* (Mcq.)

### Subgenus *Jantia* Rohdendorf, 1937

Fauna SSSR 19 (1): 251.
**Type species:** *Sarcophaga securifera* Villeneuve, 1908 (syn. of *Sarcophaga crassipalpis* Macquart, 1839).

Cercus without spines, apex distally inflated, tip hooklet-shaped; membranal lobe short ledge-like; lateral arms of apical plate very prolonged, slender widening apically; gena with white hairs, no black setulae. Includes two species: *L. cultellata* Pand. which is purely west-Mediterranean, and *L. crassipalpis* which tends towards culturophily in subtropical and tropical biomes.

### *Liopygia (Jantia) crassipalpis* (Macquart, 1839)

in: Webb & Berthelot Hist. Nat. Canaries 2 (2): 112 *(Sarcophaga).*

*Sarcophaga securifera* Villeneuve, 1908. in: Becker, Mitt. Zool. Mus. Berlin 4: 123.

**Description**

♂. Frons at narrowest part 0.22-0.25, at vertex 0.26-0.28 and at antennal base 0.36-0.4 head width; frontal vitta 1.6-2 times wider frontoventrally, frons middle 0.7-1.2 times wider than parafrontal; 3rd antennomere 2-3 times longer than 2nd; parafacial at antennal base 0.18-0.28 and gena 0.25-0.34 eye height; palpus medium-length, apically almost not wider; one row of postorbitals, vte indistinct; fr 8-13, not very strong, crossed; parafacial bristles very delicate, short and hairy; facial ridge at lower 0.3-0.4 shortly bristled; ac 0+1, rather delicate; scutellum with crossed ap and one pair of discals; ctenidium well developed, $f_3$ with numerous strong av, $t_3$ with long pv, without long av; costal spine small or indistinct, m-cu vein sigmoid, ratio between 3rd and 5th costal sections 1 : 0.5-0.7; abdominal tergite III without mediomarginals, sternite IV with short setae, sternite V with "brush" poorly developed and with elongate hairy marginal bristles; segment VII+VIII moderately elongate, with 6-10 strong marginals; cercus profile broad, almost straight and with a distinct preapical dorsal inflation, apex beak-shaped; pregonite long and slender, concavely curved and apically pointed, postgonite short, apically pointed, with two ventral bristles; membranal lobe very short, inflated; ventral lobe distinctly separated from paraphallus, claw-shaped; apical plate very short, its lateral arms, slender sigmoid, apex distinctly flat inflated; stylus not very long, more or less curved (Fig. 227).

Head densely golden to yellowish grey dusted, frontal vitta, antenna and palpus black or dark brown; thorax blackish with silvery golden pruinescence, mesonotal longitudinal stripes blackish, legs black, wings hyaline, abdomen silvery grey chequered; segment VII+VIII reddish brown to red and with blackish distal margin, lustrous with very delicate pollinosity, epandrium lustrous red or brownish red (Plate XII, Fig. 227).

♀. Frons at narrowest part 0.31-0.34 head width; abdominal tergite VI complete, marginal bristles and hairs of different length, central bare, colour lustrous red or brownish; sternite VII without medial tubercle, with one pair of very distinct and long marginal bristles.

Body length 8-18 mm.

**Distribution:** This thermophilic species is found in tropical and subtropical zones of all biogeographical regions due to its culturophily and synanthropy. In Europe, it reaches central France, central Germany, southern Moravia and Slovakia, Lower Austria and Hungary, and ranges eastwards to the Voronezh region and further to central Asia, China and Japan.

**Biology:** The immature stages develope in decaying meat and in invertebrate and vertebrate carcasses (Rohdendorf 1937, Séguy 1941, Artamonov 1983 etc.) and is a causative of cutaneous myiasis in sheep (Trofimov 1957) and man (James 1947, Nagakura, Isozaki et al. 1984, Cutrupi et al. 1986, Morris 1987 etc.); flies were also bred from oothecae of locusts – *Schistocerca gregaria* (Bogush 1959) and *S. cancellata* (Silveira et al. 1956).

## Subgenus *Thomsonea* Rohdendorf, 1937

Fauna SSSR 19 (1): 247.
**Type species:** *Sarcophaga barbata* Thomson, 1869 (syn. of *Myophora argyrostoma* Robineau-Desvoidy, 1830).

♂. Cercus apically with a field of short spines and preapically inflated; membranal lobes well developed, distinctly protruding, broad, apically spinose; ventral lobes distinct, poorly separated from paraphallus; apical plate short, but distinct, lateral arms spatulate. Includes a single rather cosmopolitan species.

## *Liopygia (Thomsonea) argyrostoma* (Robineau-Desvoidy, 1830)

Essai Myod.: 340 *(Myophora).*

*Sarcophaga barbata* Thomson, 1869. Kgl. svenska Fregatten Eugenies Resa 2 (1): 533.

### Description

♂. Frons at narrowest part 0.23-0.26, at vertex 0.24-0.32 and at antennal base 0.36-0.42 head width; frontal vitta distinctly wider frontoventrally, frons middle 1.2-2.5 times wider than parafrontal; 3rd antennomere 1.7-2.6 times longer than 2nd. Parafacial at level of antennal base 0.17-0.3 and gena 0.22-0.34 eye height; palpus long, distinctly widening apically; 1-2 rows of postorbital setae, vte poorly developed or indistinct; fr 8-14, medium-length; parafacial bristles short and weak, facial ridge with numerous short black setae at lower 0.4-0.6; ac 0+1, weak, scutellum with crossed ap and one pair of discals; $f_1$ often with hairy pv, $f_2$ with rows of short av and pv, $f_3$ with a row of strong av, $t_3$ with numerous long av and pv; costal spine small or absent, m-cu vein more or less sigmoid, ratio between 3rd and 5th costal sections 1 : 0.5-0.8. Abdominal tergite III without medial marginals, sternite V without "brush", with numerous short marginal hair-like bristles and with a large "window". Segment VII+VIII moderately elongate, with several hairy marginals. (Genitalia see Fig. 228).

Head densely silvery grey or yellowish white dusted, frontal vitta, antenna and palpus black, palpus sometimes reddish brown distally; thorax with grey pruinescence and black longitudinal stripes; legs black, wing hyaline, abdominal pattern chequered. Segment VII+VIII black or brownish red, lustrous, with grey pollinosity, epandrium shining red.

♀. Frons narrowest part 0.32-0.34 head width, abdominal tergite VI brown to reddish, grey dusted, complete, with long and short marginal bristles and hairs; sternite VII with marginal tubercle near anterior margin and 1-2 pairs of short lateromarginals.

Body length 7-17 mm.

**Distribution:** Excepting Australia and New Zealand the species occurs in all zoogeographical regions, due to its culturophily and synanthropy. In northerly latitudes the species inhabits only human agglomerations. Late summer males or "cold weather" males show blackish abdominal lip.

**Ecology:** Flies visit decaying substrates, faeces, carcasses, and fead also at flowers. Larvae develop in decaying meet or they pursuit fly maggots in faeces (Aldrich 1916, Rohdendorf 1937, Zakharova 1961, 1965, Leclercq 1976). Flies were reared from dead snails (Groth & Reismüller 1973), fish (Artamonov 1987, and pers. observation), cat excrement (Kühlhorn 1987), bird droppings (Yates 1966) and nests

[*Troglodytes aegon* (McAtee 1927)], dead pidgeon (Woodroffe 1953); larvae are also known predators and parasitoids of snails (Lundbeck 1927), acridoid oothecae – *Schistocerca gregaria, S. paranensis, Dociostaurus maroccanus* (Séguy 1941a), adults of *Locusta migratoria* (Rohdendorf 1937), scarabeid beetles (*Melolontha hippocastani* – Rohdendorf 1937), *Lachnosterna* (Aldrich 1916), cerambicid beetles (*Aelostes sorta* – personal observation), pupae of *Lymatria monacha* (Baer 1921, Slamečková 1961); larvae are involved with human myiasis (Tölg 1913, Sacca 1945, James 1947, Burgess 1966) and secondary myiasis of sheep (Baranov & Ježič 1928, Trofimov 1957).

**Pupal parasites:** Chalcididae – *Brachymeris minuta*; Eucoliidae – *Eucolia trichopsila* (Sychevskaya 1964) Braconidae – *Alysia manducator, Aphaereta minuta* (Vinogradova & Zinovyeva 1972; Zinovyeva & Vinogradova 1972).

## Subgenus *Varirosellea* Hsue, 1979

Acta Entl. Sinica 22 (2): 192.
**Type species:** *Sarcophaga uliginosa* Kramer, 1908

Cercus without spines, distinctly sattled dorsally and with a longitudinal furrow combined with a hair tuft apically; membranal lobe consists of rounded proximal and hook-shaped distal part; ventral lobe very small, rounded, but distinctly separated from paraphallus, and well sclerotized; apical plate narrow, elongate and membranous, lateral arms long and broad, apex moderately pointed. Abdominal tergite VI in ♀ complete but membranous along a narrow dorsal longitudinal stripe. One holarctic species.

### *Liopygia (Varirosellea) uliginosa* (Kramer, 1908)

Ent. Wbl. 25: 152 (*Sarcophaga*).

#### Description

♂. Frons at narrowest part 0.15-0.23, at vertex 0.18-0.27 and at antennal base 0.37-0.42 head width; frontal vitta 1.2-1.7 times widening frontoventrally, frons middle 2-3.5 times wider than parafrontal; 3rd antennomere 2-3.5 times longer than 2nd. Parafacial at antennal base 0.19-0.26 and gena 0.25-0.33 eye height. Palpus long, apex moderately inflated; one row of postorbital setae, vte indistinct, fr 9-14, crossed; parafacial with 2-3 rows of bristles, longest of them distinctly shorter than parafacial width; facial ridge densely black setose at lower 0.4-0.6. Gena with long black bristles, its hind part whitish setose; ac 0-3+1, delicate, sometimes only hairy; scutellum with crossed ap and a pair of discals; ctenidium distinct, consisting of short thick bristles; $t_3$ with numerous long pf, without elongate av; costal spine small or indistinct, m-cu vein distinctly sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.9. Abdominal tergite III without medial marginal bristles; segment VII+VIII almost square, without marginal bristles. Genitalia see on Fig. 230.

Body ground coloration dark grey; head golden to silvery grey pollinose, frontal vitta, antenna and palpus black; thorax with silvery to golden pruinescence, longitudinal stripes on mesonotum distinct, blackish; legs black, wings hyaline; abdomen with dark chequered pattern; genitalia lustrous black, segment VII+VIII slightly pale dusted.

♀. Frons at narrowest part 0.33-0.36 of head width, frontal vitta 1.2-2 times wider than parafrontal; abdominal tergite VIII with numerous long and delicate marginals; genitalia black.

Body length 8-17 mm.

**Distribution:** Holarctic; in Europe reaching Denmark and St. Petersbourgh in north, expanding to Transcaucasia, central Asia, Siberia, Mongolia, northern China, Korea, Japan and North America. The species accompanies the forest zone. Larvae are obligatory predators of lepidopterous pupae: *Aporia crataegi, Dasychira albodentata, Dendrolimus pini, D. sibiricus, Euproctis chrysorrhoea, Euxoa segetum, Leucoma candida, Lymantria dispar, L. monacha, Porthesia similis, Malacosoma neustria, Orgyia antiqua, Selenephera lunigera, Stilpnotia salicis, Vanessa xanthomelas* (Kramer 1911, Baer 1921, Grunin 1954, Girfanova 1957, Kolomyiec 1958, 1966, Khitzova 1968, Nakonechnyi, 1973a,b, Nakonechnyi, Ivliev &

Jaščenkov 1973, Herting & Simonds 1976, Stepanova, Girfanova et al., 1977, Yafaeva, 1978, Artamonov, 1985, Pape 1987b, Wyatt & Sterling 1988).

**Pupal parasites:** *Gemiocerus* sp. (Khanislamov et al. 1958), Pteromalidae *(Dibrachus cavus)*, Chalcididae *(Brachymeria minuta)*, Ichneumonidae *(Exolytus splendens)*, Bombyliidae *(Hemipentes maurus* – Kolomyiec 1957).

**Comments:** The species is in decline in western Europe, possibly due to insecticides applied in forest protection and by general deforestation.

### Genus *Parasarcophaga* Johnston & Tiegs, 1921

Proc. Roy. Soc. Queensl. 33: 86.
**Type species:** *Sarcophaga omega* Johnston & Tiegs, 1921 (syn. of *Sarcophaga sericea* Walker, 1852).

Grey flies, medium-sized to robust. Parafacial bristles shorter than parafacial; 3rd antennomere not less than 2-2.5 times longer than 2nd; costal spine short or indistinct; ♂ abdominal sternite IV shortly haired; segment VII+VIII square or moderately elongate; membranal process complete, trilobate; ventral lobes more or less connected with paraphallus, elongate and well sclerotized; apical plate elongate and bilobate, lateral arms absent or very short; stylus long and narrow, bristle-like; ♀ mid-femoral organ distinct, large and long, reddish to brownish black; abdominal tergite VI divided or complete; tergite VII and often VIII membranous, but distinct. Includes more than 60 species distributed in different geographical regions; one species in central Europe.

### Subgenus *Parasarcophaga* (s. str.)

$r_1$ bare, propleuron bare; ♂ abdominal tergite IV with short hairs; pregonite distinctly longer than postgonite; membranal lobes petiolate; ventral process hook-shaped; apical plate without lateral arms; stylus medium-length. ♀ abdominal tergite VI bilobate, sternite VIII poorly sclerotized. Includes 6 Old World species, one occurrning in central Europe; larvae are schizophagous.

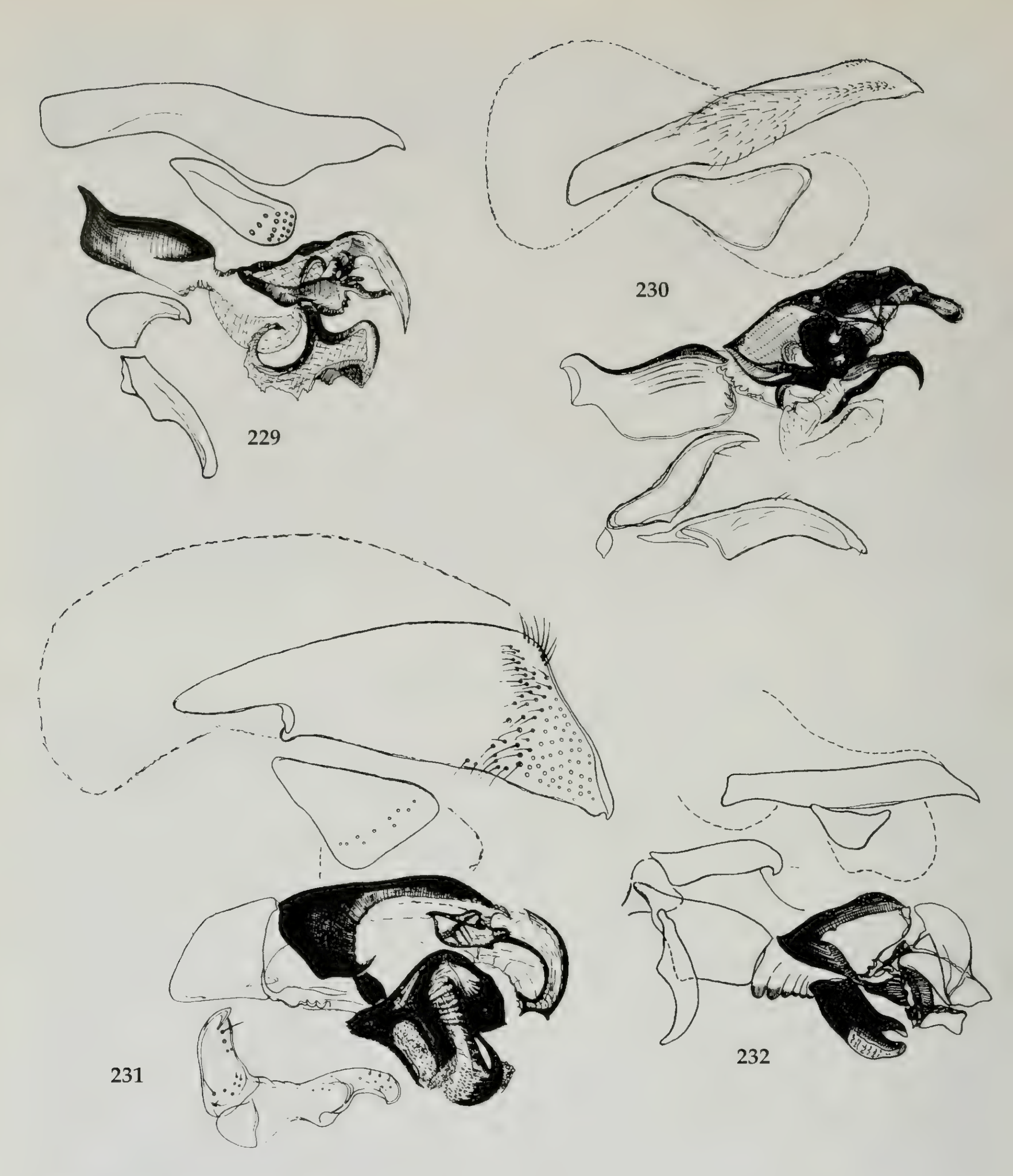
**References:** Kano, Field & Shinonaga 1987. Fauna japon. (Sarcophagidae): 39-47.

### *Parasarcophaga* (s. str.) *albiceps* (Meigen, 1826)

Syst. Beschr. 5: 22 *(Sarcophaga)*.

#### Description

♂. Frons at narrowest part 0.19-0.26, at vertex 0.22-0.31 and at antennal base 0.34-0.46 head width; frontal vitta 1.2-1.8 times wider frontoventrally; frons middle 2-3 times wider than parafrontal. 3rd antennomere 2-3 times longer than 2nd. Parafacial at level of antennal base 0.17-0.24 and gena 0.22-0.38 eye height. Palpus medium-length, apex distinctly inflated. One row of postorbital setulae, vte indistinct; fr 9-13, crossed. Parafacial with 1-2 vertical rows of bristles, longest not exceeding 0.3-0.6 of parafacial width; facial ridge shortly haired at lower 0.4-0.6 of parafacial width; facial ridge shortly haired at lower 0.4-0.7. Gena posterior part with white hairs, anterior part blackish bristled. ac 0-1+1, very delicate and short, sometimes hairy. Ctenidium well developed, $f_3$ with several strong av, $t_3$ with a row of long pv, long av absent; m-cu vein distinctly sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.8. Abdominal tergite III without medio-marginals or with their indication; sternite V without "brush", with dense marginal bristles and hairs; segment VII+VIII square, without marginals. Cercus profile medium-width, almost straight, pointed apically, with short distinct saddle between basal and apical part of dorsal ledge, without spines; pregonite almost atraight, apically slenderer, tip rounded, postgonite with rather broad bases, strongly narrowed and apically pointed, moderately curved, with 2 ventral hairs; medial part of membranal lobe short and rounded, lateral parts elongate proximally and curved dorsally, apically pointed; apical plate very narrow, tapering ventrally, apex more or less pointed, stylus short (Fig. 229).




**Figs. 229.-232.** Male genitalia profile of:
**Fig. 229.** *Parasarcophaga albiceps*
**Fig. 230.** *Rosellea uliginosa*
**Fig. 231.** *Kramerea schuetzei*
**Fig. 232.** *Rosellea aratrix*

Ground coloration dark grey; head silvery grey to golden pollinose, frontal vitta, antenna and palpus black; thorax black, with silvery to golden pruinescence, mesothoracic striae blackish, legs black, wings hyaline; abdominal pattern silvery grey and dark grey chequered, genitalia lustrous black, segment VII+VIII densely grey dusted.

♀. Frons narrowest part 0.27-0.32 head width; abdominal tergite VI with bristles as strong as tergite V marginals and with a distinct dorsal fold; tergite VII complete and bare; sternite VII without posterior excision, with a row of marginal bristles; terminalia black to reddish black.

Body length 8-17 mm.

**Distribution:** A common culturophile and synanthropic species, widely distributed in the Palaearctic, Oriental and Australian regions; found in Europe up to Norway, Finland and Karelia.

**Ecology:** Flies belong to frequent visitors of faeces, decaying meat and similar substrates. Schizophagous larvae develop in animal carcasses (Senior-White 1924, Rohdendorf 1937, Sukhova 1951, Gregor & Povolný 1961, Trofimov 1965, 1969, Zakharova 1967, Sychevskaya 1972, Artamonov 1983, 1987, 1988, Pape 1987b, Blackith & Blackith 1988). Larvae attack lepidopterous larvae and pupae, e.g. *Aporia crataegi, Dasychira albodentata, Dendrolimus albolineatus, D. pini, D. segregatus, D. sibiricus, Lymantria dispar, L. monacha, Nonagria* sp., *Orgyia antiqua, Selenephera lunigera* (Vasiliev 1902, 1913, Baer 1921, Matsumura 1926, Senior-White at al. 1940, Kolomyietz 1958, Girfanova 1962, Nakonechnyi 1973, Herting & Simonds 1976), beetles *Saperda populnea, Melolontha, Polyphylla fullo, Oryctes nasicornis* (Baer 1921, van Emden 1950); tenthredinid larva *Acantholyda postialis* (Lee 1963). The maggots are involved in cases of myiasis in cattle and man (Senior-White 1924, James 1947).

**Parasites in puparia:** Figitidae *(Figites scutellaris)* (Sychevskaya 1964).

## Genus *Robineauella* Enderlein, 1928

Arch. klassif. Phylogen. Ent. 1 (1): 23.
**Type species:** *Sarcophaga scoparia* Pandellé, 1896 (syn. of *Sarcophaga caerulescens* Zetterstedt, 1838).

Propleuron and $r_1$ bare, 3rd antennomere not less than 2-2.5 times longer than 2nd; parafacial bristles not exceeding parafacial width or even shorter; occiput and postgena pale setose. ♂ abdominal sternite IV with long erect hairs; 2 pairs of membranal process; apical plate bilobate, elongate, without lateral arms; stylus slender, short. ♀ mid-femoral organ large and elongate, reddish to brownish black; abdominal tergite VI bilobate. Includes 2 subgenera and 11 species in Holarctic and Oriental regions; 2 species in central Europe. Larvae necrophagous, predators or facultative parasitoids of insects etc.

### Key to subgenera and species (♂♂) of *Robineauella*

1. Abdominal sternite V with a pair of short processes on interior surface of apical arm base; $f_2$ with ctenidium (subg. *Digitiventra* Fan). Cercus with distinctive preapical dorsal tuft of hairs, tip of apical plate curved dorsally (Fig. 233) ........................................................ *R. (D.) pseudoscoparia* (Kr.)
– Sternite V without processes, $f_2$ without ctenidium (subg. *Robineauella* s.str.). Cercus without dorsal hair tuft; tip of apical plate straight (Fig. 224) ........................................ *R.* (s. str.) *caerulescens* (Ztt.)

### Subgenus *Digitiventra* Fan, 1964

Acta zootaxon. sin. 1 (2): 306.
**Type species:** *Sarcophaga pseudoscoparia* Kramer, 1911.

♂. Mid-femur with ctenidium; abdominal sternite V with pair of digitate short processes on interior surface of apical arm base. ♀ abdominal sternite VI short, not protruding; tergite VII distinct. Includes 5 species, one in central Europe.

## *Robineauella (Digitiventra) pseudoscoparia* (Kramer, 1911)

Abh. naturforsch. Ges. Görlitz 27: 142 *(Sarcophaga).*

### Description

♂. Frons at narrowest part 0.2-0.23, at vertex 0.22-0.27 and at antennal base 0.33-0.38 head width; frontal vitta 1-2 times wider frontoventrally, frons middle 1.6-3.5 times wider than parafrontal; 3rd antennomere 2-3 times longer than 2nd; parafacial at level of antennal base 0.21-0.25 and gena 0.24-0.34 eye height; palpus moderately long, apex distinctly inflated; one row of postorbital setulae, vte indistinct; fr 8-11, strong and crossed; 1-2 rows of parafacial bristles, longest of them distinctly shorter than parafacial width; facial ridge at lower 0.5-0.7 shortly haired; occiput and postegena partly pale setose, gena antirely blackish bristled; ac 0+1, rather delicate; scutellum with crossed ap and with one pair of discals; ctenidium distinct; all femora and hind tibia with long dense ventral hairs, $t_3$ with numerous long pv hairs, without av; costal spine absent or very short; m-cu vein distinctly sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.9. Abdominal tergite III without mediomarginals; sternite V without "brush", with digitate paired short processes at apical arm base. Segment VII+VIII distinctly elongate, without marginal bristles; genitalia in Fig. 233 and Plate IX, Fig. 15.

Body ground coloration dark grey; head yellowish grey or yellowish white pollinose; frontal vitta, antenna and palpus black; thorax grey dusted, longitudinal mesonotal stripes blackish, distinct, legs black, wings hyaline; abdomen with usual dark and grey chequered pattern; segment VII+VIII black, grey pollinose; epandrium lustrous black.

♀. Frons at narrowest part 0.32-0.35 head width; each part of abdominal tergite VI at least 3-3.5 times wider than long, with numerous long and fine marginals and short discals; tergite VII complete, subtriangulate, membranous and bare. Genitalia black.

Body length 8-17 mm.

**Distribution:** Holarctic taxon distributed from Europe to Japan and North America, accompanying the holarctic forest belt.

**Ecology:** Larvae are necrophagous, predators and parasitoids, especially of lepidopterous pupae: *Aporia crataegi, Cosmotriche potatoria, Dasychira albodentata, Dendrolimus sibiricus, Lymantria dispar* and *L. monacha, Malacosoma neustria, Orgyia antiqua, Selenephera lunigera* (Kramer 1911, Kolomyietz 1958, Girfanova 1962, Nakonechnyi 1973a, b, Orlov & Jurchenko 1978, Artamonov 1985, Coulson et al. 1986).

**Parasites of puparia:** *Gemiocerus* sp., *Brachymeria minuta* (Girfanova 1957), *Exotylus splendens, Hemipenthes maurus* (Kolomyietz 1957).

**Comments.** Together with other forest-belt species such as *Liosarcophaga tuberosa* and *Liopygia uliginosa, R. pseudoscoparia* is endangered by forest disintegration and is disappearing from many habitats.

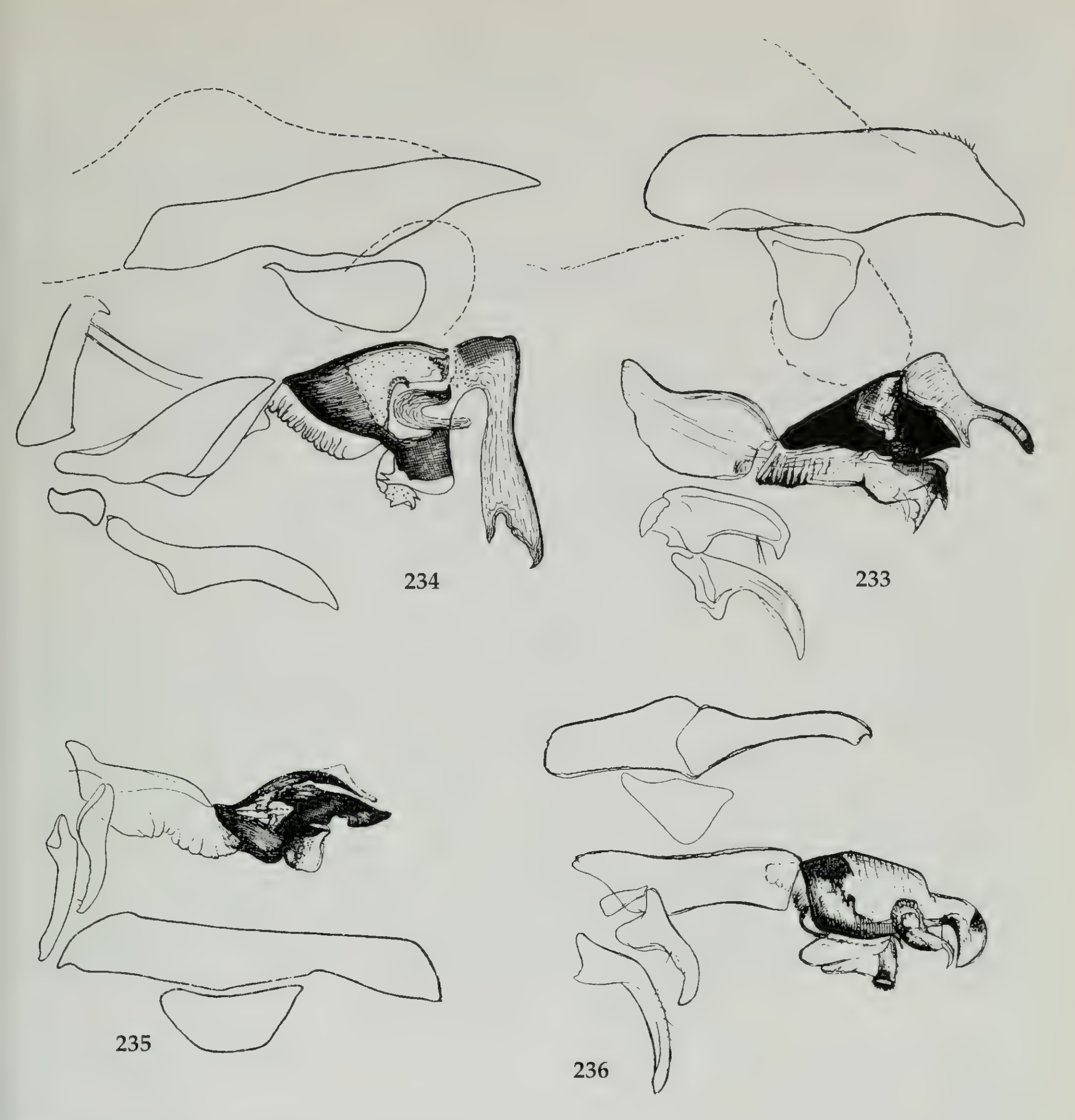
## *Robineauella* (s. str.) *caerulescens* (Zetterstedt, 1838)

Ins. Lapp. 650 *(Sarcophaga).*

*Sarcophaga scoparia* Pandellé, 1896. Revue Ent. 15: 189.

### Description

♂. Frons at narrowest part 0.2-0.25, at vertex 0.22-0.29 and at antennal base 0.35-0.41 head width; frontal vitta 1.2-2 times wider frontoventrally, frons middle 2-3.5 times wider than parafrontal; 3rd antennomere 2-2.6 times longer than 2nd; parafacial at antennal base 0.26-0.35 and gena 0.28-0.4 eye height; palpus long and narrow, apex moderately inflated; one row of postorbital setulae, vte indistinct, fr 9-14, long and crossed; parafacial with 3-5 rows of fine bristles, longest of them as long as parafacial width; facial ridge short-bristled at lower 0.3-0.5; ac 0+1, delicate, dc 4-5+4, strong; scutellum with ap and d one pair each; ctenidium indistinct; all femora, mid and hind tibia long and densely haired ventrally; $t_3$ with a row of long pv. Costal spine small, m-cu vein distinctly sigmoid, ratio between 3rd and 5th costal sections 1 : 0.6-0.9; abdominal tergite III without mediomarginals, sternite V without "brush" and long bristled; segment VII+VIII wide and elongate, with more or less




**Figs. 233.-236.** Male genitalia profile of:
**Fig. 233.** *Robineauella (Digitiventra) pseudoscoparia*
**Fig. 234.** *Robineauella caerulescens (scoparia* auct.)
**Fig. 235.** *Sarcophaga moldavica*
**Fig. 236.** *Stackelbergeola mehadiensis*

distinct bristles; cercus base broad and moderately narrower apically, apex curved and pointed; pregonite curved ventrally with lateral narrow groove preapically, and with a moderately protruding obtuse tip; postgonite moderately long, narrow, hook-shaped, pointed apically, distinctly shorter than pregonite, with 2 ventral bristles; membranal lobe short spinose, both pairs of equal size; ventral process vell sclerotized, distinctly tipped in posterior ventral angle; stylus short; each lobe of apical plate with distinct ventral spine and forming an open circle in apical view (Fig. 234).

Body ground colour dark grey; head silvery to golden pollinose; frontal vitta, antenna and palpus black; thorax with silvery grey to golden greyish pruinescence, mesonotal longitudinal stripes broad, blackish, legs black, wings hyaline, abdomen with usual dark chequered pattern; genitalia black, segment VII+VIII densely pollinose, epandrium lustrous black.

♀. Frons at narrowest part 0.29-0.35 head width; lateral lobes of abdominal tergite VIII triagulate, distinctly protruding, with a row of marginals, black, grey pollinose. Tergite VII reduced.

Body length 7-19 mm.

**Distribution:** Holarctic, occurring in Europe up to Sweden, Norway and Karelia in the North; and eastwards to Transcaucasia, Kazakhstan, south Siberia, Far East, China, Korea and Japan; and in Alaska.

**Biology:** The species prefers forested or at least bushy formations in lowland and montane elevations up to the timberline; unlike several declining taxa of *Parasarcophaga* (s. lat.) accompanying forest habitats, it appears not to be very sensitive to loss of habitat or environmental change, and shows considerable ecological potence. Flies feed at flowers and visit decaying organic substrates. Larvae decompose invertebrate and vertebrate carcasses (Kano et al. 1967, Eberhardt 1955, Sychevskaya 1970, Hanski & Kuusela 1980, Artamonov 1987 etc.) or predate especially on lepidopterous pupae *(Lymantria dispar* and *L. monacha* – Kramer 1908, Girfanova 1962). They can be easily reared in laboratory conditions on animal meat, liver, fish etc.

## Genus *Stackelbergeola* Rohdendorf, 1937

Fauna SSSR 19 (1): 257.
**Type species:** *Sarcophaga mehadiensis* Böttcher, 1912

Grey, stout flies, 3rd antennomere 2-4 times longer than 2nd; parafacial broad, shortly haired. Occiput and postgena with white hairs; ac 0+1, short, postsutural dc 5-7, fore 2-3 dc rather delicate; propleuron bare, $r_1$ bare, $R_5$ broadly open, m-cu vein more or less sigmoid, 3rd costal section distinctly longer than 5th; abdominal tergite III without mediomarginals; abdomen with bright chequered pattern, mesonotal longitudinal stripes black and distinct; and a medial longitudinal black stripe also distinct on abdominal tergites II-V; ♂ ctenidium well developed, abdominal sternite IV with long erect hairs, sternite V U-shaped, without "brush", segment VII+VIII large and broad, moderately elongate, with a row of strong marginals; apical part of cercus slender (narrow) and provided with a terminal hooklet, basal part inflated, separated from apical part by a transverse alate fold; pregonite elongate and narrow, distinctly curved ventrally, apex obtuse, postgonite short and broad, hook-shaped, with 2-3 ventral bristles; membranal process trilobate, two apical lobes spinose, basal lobe both with or without spine; ventral process well sclerotized, hook-shaped; apical plate elongate and wide, apex more or less pointed, bilobate, without lateral arms, stylus short, medial process large, more or less visible laterally. ♀ unknown. 5 species found in arid mountains of Palaearctic region; one species in Europe.

### *Stackelbergeola mehadiensis* (Böttcher, 1912)

Ent. Mitt. 1 (4): 114 *(Sarcophaga).*

**Description**

♂. Frons at narrowest part 0.24-0.25, at vertex 0.27-0.28 and at antennal base 0.4-0.42 head width. Vitta frontalis 2-2.5 times wider frontoventrally, at frons middle 1.1-1.3 times wider than parafrontal; 3rd antennomere 2-2.5 times longer than 2nd. Parafacial at antennal base 0.28-0.33 and gena 0.29-0.35 eye height. Palpus long, apex moderately inflated; one row of postorbital setulae; vte indistinct; fr 9-12, long and strong; p parafacial with 3-4 irregular rows of short setulae; facial ridge shortly bristled at lower 0.3; scutellum with crossed ap and 1-2 pairs of discals; all femora and hind tibia long densely haired ventrally; $f_3$ with a row of 6-8 strong av bristles. Costal spine indistinct; ratio between 3rd and 5th costal sections 1 : 0.6-0.7, basal lobe of membranal processes as long or shorter than apical ones, without spine; postgonite comparatively narrow (slender), rounded apically; apical plate rather broad (Fig. 236).

Body ground coloration pale grey, head densely silvery white dusted, frontal vitta, antenna and palpus black; thorax grey pollinose, longitudinal stripes on mesonotum broad and blackish; abdomen with bright grey chequered pattern and with a distinct dark longitudinal stripe; legs black, wings

hyaline; genitalia lustrous, segments VII+VIII black, epandrium reddish brown.

♀ unknown.

Body length 10-14.5 mm.

**Distribution:** Occurs in foothills of the French Alpes Maritimes, eastern foothills of Alps, southern Moravia, Rumanian Carpathian foothills, North Caucasus (Dagestan), Armenia and Azerbaijan. Ecology unknown.

## Subtribe Boettcheriscina Verves, 1989

Mem. Inst. Oswaldo Cruz 84 (4): 540.

♂. Frons narrower than eye-width, ♀ frons as wide as eye. 3rd antennomere usually more than 2-2.5 longer than 2nd; parafacial setose or bristled; parafacial and gena medium-width or broad; propleuron bare or setose; postsutural dc multiple (4-8 pairs); $R_5$ usually open, $r_1$ bare; membranal lobes, ventral processes and apical plate of aedeagus well developed, often at least partly spinose; stylus widening, spinose or with processes. Abdominal tergites VII and VIII partly reduced or membranous in ♀.

13 genera and about 50 species distributed in the Old World, Oceania, Australia and North America. Two genera and two species in central Europe. Maggots generally schizophagous.

## Genus *Kramerea* Rohdendorf, 1937

Fauna SSSR 19: 274.
**Type species:** *Sarcophaga schuetzei* Kramer, 1909.

Dark, medium-sized flies. Parafacial with 1-2 vertical rows of fine bristles, longest of them as long as parafacial width, upper part with numerous short hairs; occiput and postgenae with numerous hairs and several black setae; propleuron setose. ac 0+1, dc 2-3+4-5; $R_5$ open; ♂ $f_2$ with ctenidium. ♂ genitalia with sternite V without ventral protuberance; cercus short and distinctly widened, almost straight, spinose, apically pointed; distiphallus short and dilated; paired lateral process of apical plate spinose. ♀ with abdominal tergite VI bilobate, tergites VII and VIII reduced (absent). Body colour dark; entenna and palpus black; thorax black, greyish pollinose, legs black; wing hyaline, abdomen with dark chequered pattern, genitalia black. One species.

### *Kramerea schuetzei* (Kramer, 1909)

Ent. Rdsch. 26: 14 *(Sarcophaga).*

#### Description

♂. Frons at narrowest part corresponding to 0.17-0.25, at vertex to 0.2-0.27, at antennal base to 0.3-0.41 of head width; frontal vitta 1.5-2.4 times wider frontoventrally, frons middle 1.5-2 wider than parafrontal; 3rd antennomere 2.4-3.2 × longer than 2nd; parafacial at antennal base 0.22-0.32, gena 0.25-0.4 of eye height; palpus medium length, distinctly inflated apically; 3 rows of postorbital setae, vte distinct, fr 11-14, long and crossed. Lower 0.6-0.7 of facial ridge with numerous black short setae. Scutellum with ap crossed, one pair discals. All femora and hind tibia with numerous black setae on ventral surface; $f_3$ with 7-10 strong av. Costal spine indistinct, m-vein right-angled, m-cu vein distinctly sigmoid, ratio between 3rd and 5th costal section as 1:0.6-0.8. Abdominal tergite III without mediomarginals; sternite V without "brush", but with strong bristles on hind lobes; segment VII+VIII short and broad, without marginals. Genitalia with gonites short; pregonite very broad, hook-shaped, strongly curved dorsally, postgonite moderately wide, almost straight, apically pointed. Apical plate elongate narrow and curved ventrally (Fig. 231).

Parafacial and parafrontal yellowish grey or golden grey dusted; frontal vitta black. Longitudinal mesonotal stripes distinct, brownish black. Abdominal segment VII+VIII distinctly grey dusted, epandrium lustrous.

♀. Frons at narrowest part 0.33-0.35 of head width; mid-femoral organ distinct, reddish; both parts of abdominal tergite VI with numerous long marginals.

Body length 7-14.5 mm.

**Distribution:** From Germany and Switzerland in the West throughout Europe and palaearctic Asia (Siberia, Kazakhstan, Mongolia, Russian Far East, northern China, Korea and Japan.

**Ecology:** The species prefers forested territories and areas between 200-1.500 m a.s.l. Larvae develop in small animal cercasses (Artamonov 1987, 1988) and are facultative predators of lepidopteran caterpillars and pupae: e.g. *Aporia crataegi, Dasychira albodentata, Dendrolimus pini, D. sibiricus, D. spectabilis, Dyctioploca japonica, Lymantria dispar, L. monacha, Orgyia antiqua, Selenephera lunigera* (e.g. Kramer 1909, Baer 1921, Nakonechnyi 1973a,b, Nakonechnyi et al. 1973, Herting & Simonds 1976, Artamonov 1985, 1987, 1988 etc.).

**Comments.** The species is endangered in Europe, and is disappearing especially from disintegrated forest ecosystems.

## Genus *Rosellea* Rohdendorf, 1937

Fauna SSSR 19: 242 (subgenus of *Parasarcophaga* Johns. & Tiegs).
**Type species:** *Sarcophaga aratrix* Pandellé, 1896.

Grey flies, medium-sized to big. Parafacial with short setae, longest of them not exceeding 0.5-0.7 of parafacial width. Occiput and postgena with numerous long whitish hairs; propleuron bare; ac 0+1, dc 2-3+4-6. Open $R_5$, costal spine very short, indistinct; ♂ $f_2$ with more or less developed ctenidium. ♂ with abdominal sternite V strongly arched, its profile forming a dentate appendix; cercus elongate, without spines; membranal and ventral lobe well developed, elongate, without spines; apical plate well developed, elongate, with short dentate lateral processes, not spinose; stylus large and broad, not dentate, complete; abdominal tergite VI of ♀ complete, but more or less membranous dorsally; tergites VII and VIII reduced (absent).

Maggots necrophagous. 6 species in Holarctic and Oriental regions. One central European species.

### *Rosellea aratrix* (Pandellé, 1896)

Revue ent. 15: 191 *(Sarcophaga)*.

#### Description

♂. Frons at narrowest part 0.17-0.24, at vertex 0.2-0.27, at antennal base 0.3-0.41 width of head. Frontal vitta 1.5-2.1 times wider frontoventrally, frons middle 1.5-2.5 times wider than parafrontal; 3rd antennomere 1.8-2.7 times longer than 2nd; parafacial at antennal base 0.28-0.36, gena 0.28-0.39 of eye height; palpus long, apically widening, 2-3 regular rows of postorbitals, vte indistinct, fr 10-13 strong and long; 1-2 vertical rows of short parafacial setae. Facial ridge shortly haired at lower 0.3-0.5; scutellum with ap and one pair of d-bristles. All femora with long ventral hairs; $f_2$ with a complete row of av and with a distal row of short pv; $t_3$ with a row of long pv and v; m-vein right-angled, m-cu distinctly sigmoid; ratio between 3rd and 5th costal sections as 1 : 0.6-0.9. Abdominal tergite III with a pair of delicate mediomarginals (sometimes absent); sternite V with short but strong bristles, but "brush" absent. Abdominal segment VII+VIII shortened, without marginals. Cercus long, almost straight moderately thick, apex elongate spinose, protruding ventrally; gonites of equal length, hook-curved; membranal process trilobate. Two broad lateral parts and a narrow central part; ventral process short, apically pointed; apical plate bilobate (Fig. 232).

Body color grey. Head golden or yellowish grey dusted, frontal vitta, antenna and palpus black; 2nd antennomere usually reddish or brown apically. Thorax grey dusted, longitudinal mesonotal stripes black, well developed; legs black, wings hyaline. Abdomen grey with chequered pattern; segment VII+VIII black, grey pollinose, epandrium lustrous black.

♀. Frons at narrowest part 0.3-0.34 head width. Mid-femoral organ elongate, reddish. Tergite VI with 1-2 rows of strong marginals, complete, moderately desclerotized dorsally. Membrane under

tergite VII with a central, almost square sclerotization (possibly a rudiment of tergite VII). Sternite VII shortened, without distinct caudal fold, with few short setae posterolaterally; terminalia black.

Body length 6-15 mm.

**Distribution:** Transpalaearctic from Ireland to Kamchatka, introduced into North America; absent from arid zones and habitats.

**Ecology:** The species prefers forest sites and tends towards culturophily; larvae are facultative predators (parasitoids) of lepidopteran pupae, especially *Lymantria monacha* (Kramer 1910), and adults of cerambycid beetles [*Prionus coriarius* (Saalas 1943)], but may avoid predation developing in insect and small animal carcasses generally (e.g. Eberhard 1955, Zakharova 1967, Kuusela & Hanski 1982, Blackith & Blackith 1984). Like many other forest dwelling flesh-flies, this species is withdrawing from the west to the east of Europe.

### Subtribe *Sarcophagina* Macquart, 1835

♂. Frons narrower than width of head, ♀ frons width as eye. 3rd antennomere medium-length, 1.5-2.5 times longer than 2nd, arista with long hairs. Parafacial and gena broad, haired or bristled. ♂ genitalia with abdominal sternite V Y-shaped, apically with dense hairs, but without "brush". Abdominal segment VII+VIII elongate 1.5-2 times longer than broad, marginal bristles distinct. Cercus long, almost parallel-sided, distinct terminal hooklet, haired, without spines. Distiphallus medium-length, membranal lobes well sclerotized, widened and adjacent to the distiphallus apex. Ventral arms bristle-shaped. Stylus broad, apically funnel-formed. Apical plate membranous, without lateral processes (Figs 237-243, 246-247). ♀ mid-femoral organ well developed, elongate and reddish. Abdominal tergite VI bilobate, tergite VII membranous and haired; tergite X missing. The only genus *Sarcophaga* is purely palaearctic, most of the species being concentrated in Europe. Larvae are – so far as known – parasites of earthworms but may avoid towards schizophagy as most Sarcophagini do.

### Genus *Sarcophaga* Meigen, 1826

Syst. Beschr. 5: 14.
**Type species:** *Musca carnaria* Linaeus, 1758.

Medium-sized to big grey flies. Parafacial at antennal base 0.2-0.3, gena 0.25-0.45 head width. Palpus moderately long, apex moderately inflated; one regular row of postorbitals; vte in ♂ indistinct, in ♀ distinct; ocellar bristles fine, hairy, but one pair stronger and proclinate; fr 6-14, medium-length, crossed; parafacials one row, longest as long or moderately longer than width of parafacial; upper part of parafacial in addition shortly setose. Lower ⅓-⅖ of facial ridge shortly black setose; occiput and postgena white haired. ac 0+1, dc 3-4+4-5. ♂ scutellum with short ap absent in ♀, and 1 pair of discals; $f_2$ in ♂ with ctenidium, all femora and $t_{2-3}$ with numerous long ventral hairs, $f_2$ with apical row of short pv. $R_5$ open, $r_1$ bare, m-vein right-angled, without appendix, m-cu vein strongly sigmoid, 3rd costal section distinctly longer than 5th section. Abdominal tergite III with more or less distinct paired mediomarginals.

Body colour grey. Head grey or yellowish dusted, frontal vitta, antenna and palpus black, 2nd antennomere often reddish to brown; thorax grey or yellowish grey pollinose with distinct black longitudinal stripes on mesonotum. Legs black, wings hyaline, basicosta yellow, epaulet black to brownish yellow. Abdominal pattern black and grey chequered. ♂ genitalia black, ♀ abdominal tergite VI reddish to brown.

Body length 6-20 mm.

19 (west) palaearctic species and one species from South Africa (probably mislabelled). 11 central European species.

**References:** Baranov 1930: Encycl. ent. B 2 (Diptera) (1929), 5: 19-25; Rohdendorf 1937: Fauna SSSR 19 (1): 280-291; Lehrer 1973: Annot. zool. bot. (Bratislava) 89: 1-21; Povolný & Verves 1987: Acta ent. Mus. Natn. Pragae 42: 89-147 (a revision).

## Key to species of *Sarcophaga*

1. Stylus apically not wider; membranal lobes big and broad, alate (Fig. 242) ....... *S. ukrainica* Rohd.
– Stylus apically distinctly wider ........................................ 2.

2. Stylus broad, apex axe-shaped and wider; membranal lobes shorter; apical plate comparatively large, with numerous spines ........................................ 3.
– Stylus narrow, apically moderately broader; membranal lobes elongate or short; apical plate short, not spinose ........................................ 4.

3. Stylus almost straight, membranal lobes narrow, ventral processes short and broad (Fig. 241) .... ........................................ *S. zumptiana* Lehr.
– Stylus distinctly curved ventrally, membranal lobes medium-width, ventral processes long and narrow. (Fig. 246 ) ........................................ *S. novaki* Bar.

4. Apical part of cercus distinctly curved dorsally; pregonite almost straight (Fig. 243) ..................... ........................................ *S. moravica* Pov.
– Apical part of cercus straight or moderately curved ventrally; pregonite distinctly curved ventrally ........................................ 5.

5. Membranal lobe not reaching the end of stylus ........................................ 6.
– Membranal lobe raching the end of stylus ........................................ 8.

6. Membranal lobes broader than long (alate) (Fig. 248) ........................................ *S. bachmayeri* Lehr.
– Membranal lobe distinctly narrower than long (non-alate) ........................................ 7.

7. Cercus apex dorsally inflated; pregonite almost as long as postgonite, with an obtuse inflation in the middle of ventral margin, stylus vith rounded lateral lobes (Fig. 247) ................ *S. serbica* Bar.
– Cercus apically not inflated; pregonite distinctly longer than postgonite, without central inflation; stylus without lateral lobes (Fig. 235) ........................................ *S. moldavica* Rohd.

8. Stylus situated in a right angle towards longitudinal distiphallus axis ........................................ 9.
– Stylus parallel to longitudinal distiphallus axis ........................................ 10.

9. Membranal lobe narrow, bean-shaped; distiphallus profile with a broad membranal "window" centrally (Fig. 237) ........................................ *S. variegata* (Scop.)
– Membranal lobe broad, subtriangulate; distiphallusprofile with a narrow membranal "window" centrally (Fig. 238) ........................................ *S. lasiostyla* Mcq.

10. Paraphallus elongate; inside margin of membranal lobe distinctly arched (Fig. 240) ....................... ........................................ *S. carnaria* (L.)
– Paraphallus short; inside margin of membranal lobe almost straight (Fig. 239) .............................. ........................................ *S. subvicina* Rohd.

## *Sarcophaga bachmayeri* Lehrer, 1978

Bull et Ann. Soc. r. ent. Belg. 114: 130.

*Sarcophaga subvicina schulzi* sensu Gregor & Povolný, 1961 (nec Müller 1922). Folia zool. (Brno) 24: 25-34.

### Description

♂. Frons at narrowest part 0.19-0.23, at vertex 0.25-0.29, at antennal base 0.35-0.45 head width. Frontal vitta 1.4-2 times wider frontoventrally, frons middle 2-3 times wider than one parafacial. Ratio between 3rd and 5th costal section 1 : 0.6-0.8. Pregonite long and narrow, distinctly longer than postgonite which is short hook-shaped. Cercus apically with a short curved spine. Paraphallus stout and strongly protruding ventrally. Ventral process shorter than stylus. Membranal lobe protruding,

but not reaching the end of stylus, broader than long, alate. Stylus elongate, comparatively narrow. Apical plate narrow and elongate. (Fig. 248).

♀ unknown.

Body length 10-19 mm.

**Distribution:** The species accompanies (beech) forests of Carpathian systems preferring mountain elevations (800-1.200 m a.s.l.). Slovakia, Carpatho-Ukraine, Romania, Hungary, eastern Austria.

### *Sarcophaga carnaria* (Linnaeus, 1758)

Syst. Nat. 10: 596 *(Musca).*

*Sarcophaga schulzi* Müller, 1922. Arch. Naturgesch. A 88: 91.
*Sarcophaga subvicina vulgaris* Rohdendorf, 1937. Fauna SSSR 19 (1): 287.
*Sarcophaga romanica* Lehrer, 1967. Zool. Ant. 178: 211.
*Sarcophaga dolosa* Lehrer, 1967. Zool. Anz. 178: 215.

**Description**

♂. Frons at narrowest part 0.2-0.24, at vertex 0.25-0.32, at antennal base 0.36-0.5 head width. Frontal vitta 1.5-2 times wider dorsofrontally, frons middle 2-3 times wider than parafrontal; ratio between 3rd and 5th costal sections 1 : 0.6-0.8. Cercus almost straight with short apical hooklet; pregonite elongate and narrow, moderately curved ventrally, distinctly longer than hook-shaped postgonite. Paraphallus distinctly protruding ventrally. Membranal lobes longer than broad and almost reaching the end of elongate stylus which is distintly dilated apically; interior margin of membranal lobe more or less arched. (Fig. 240).

♀. Frons at narrowest part 0.32-0.38 head width; tergite VII reduced forming usually a paired, setose, membranous sclerite, sometimes complete.

Body length 8-19 mm.

**Distribution:** Europe including the British Isles, north to Norway and Kola Peninsula; Transcaucasia, southern Siberia to Baikal.

**Ecology:** Larvae are essentially parasitoids of earthworms (Eberhard 1955, Kirchberg 1954, 1961, Grunin 1964, Viktorov-Nabokov, Verves 1975), but may be occasionally schizophagous. The species prefers the vicinity of forests or sometimes the forest interior but is rather heliophilic.

### *Sarcophaga lasiostyla* Macquart, 1843

Hist. Nat. Ins. Dipt. 2: 257.

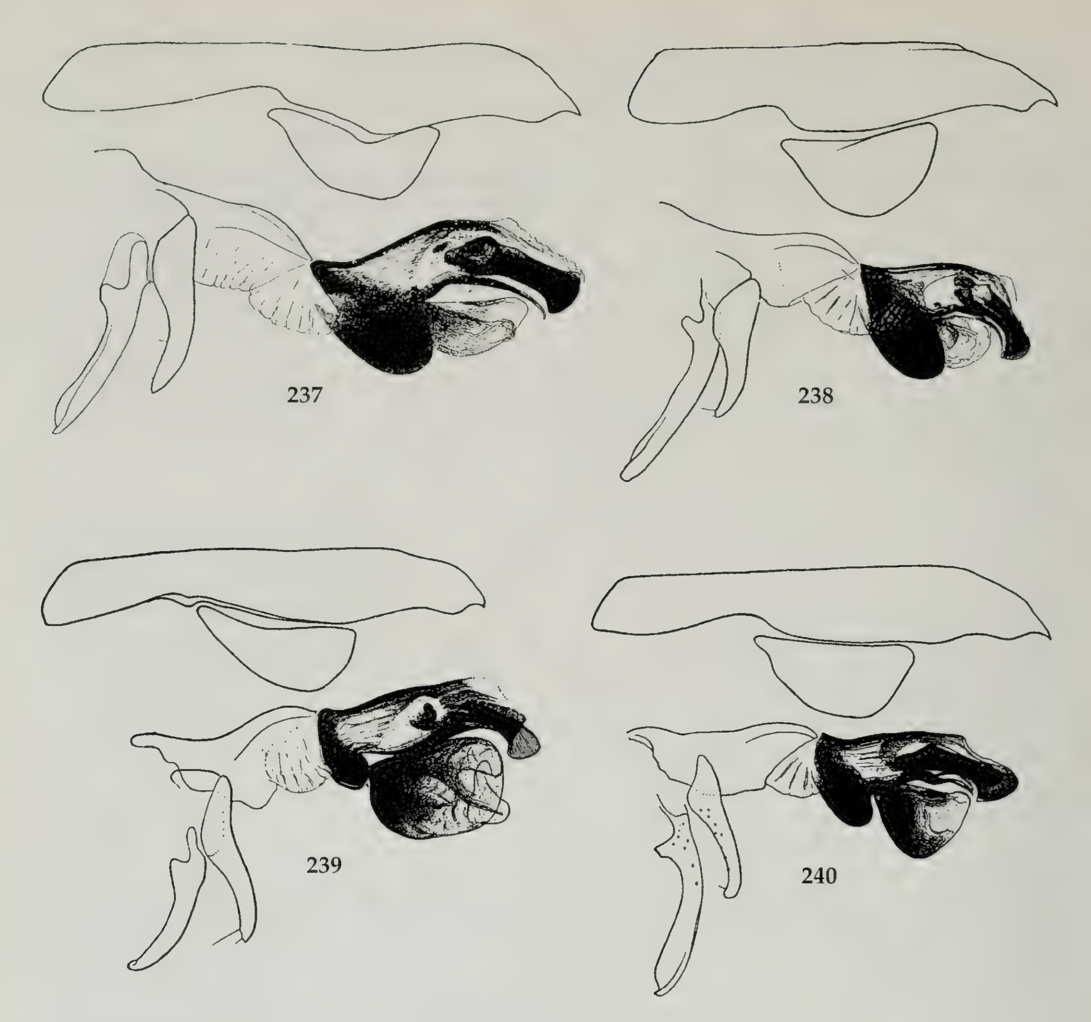
*Sarcophaga cognata* Rondani, 1860. Atti Soc. Ital. Sci. Nat. 3: 385.
*Sarcophaga lehmanni* Müller, 1922. Arch. Naturgesch. 88 A (2): 91.
*Sarcophaga carnaria meridionalis* Rohdendorf, 1937. Fauna SSSR 19: 284.

**Description**

♂. Frons at narrowest part 0.21-0.27, at vertex 0.25-0.32, at antennal base 0.34-0.45 head width. Frontal vitta 1.5-2 times wider frontoventrally; frons middle 2-3 times wider than parafrontal; ratio between 3rd and 5th costal sections 1 : 0.5-0.9. Cercus almost straight with short apical hooklet; pregonite elongate and narrow, almost straight, distinctly longer than postgonite; paraphallus stout and distinctly protruding ventrally; membranal lobe broad, triangulate, not reaching tip of stylus; stylus medium-width, apex distinctly wider and forming angle of 90°-110° to longitudinal phallus axis; apical plate very short and small, membranous. (Fig. 238).

♀. Frons at narrowest part 0.42-0.55 head width; abdominal tergite VII complete, trapezium-shaped, with lateromarginal setae.

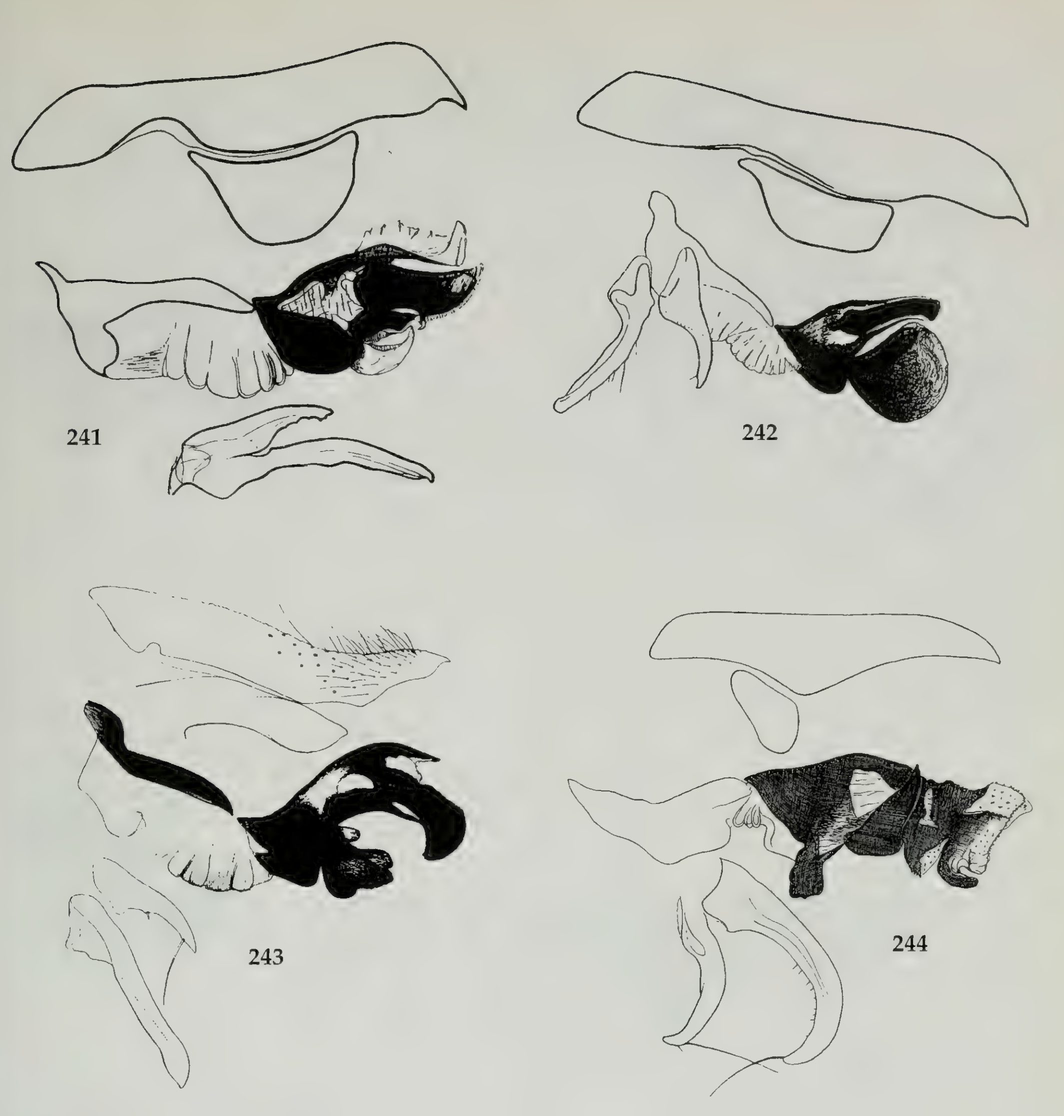
Body length 7-16.5 mm.




**Figs. 237.-240.** Male genitalia profile of:
**Fig. 237.** *Sarcophaga variegata* (*carnaria* auct.)
**Fig. 238.** *Sarcophaga lasiostyla* (*lehmanni* auct.)
**Fig. 239.** *Sarcophaga subvicina*
**Fig. 240.** *Sarcophaga carnaria* (*schulzi* auct.)

**Distribution:** Europe (absent from the British Isles) north to southern Norway and the Kola Peninsula, North Africa, Transcaucasus, Near and Middle East, southwestern Siberia, central Asia. Expansive-Mediterranean distribution.

**Ecology:** Larvae are predators or parasitoids of earthworms, but are occasionally schizophagous (Khitzova 1967, Viktorov-Nabokov & Verves 1975); flies prefer warm, sunlit habitats in or near (lowland) forests.




**Figs. 241.-244.** Male genitalia profile of:
**Fig. 241.** *Sarcophaga zumptiana*
**Fig. 242.** *Sarcophaga ukrainica*
**Fig. 243.** *Sarcophaga moravica*
**Fig. 244.** *Helicophagella novercoides*

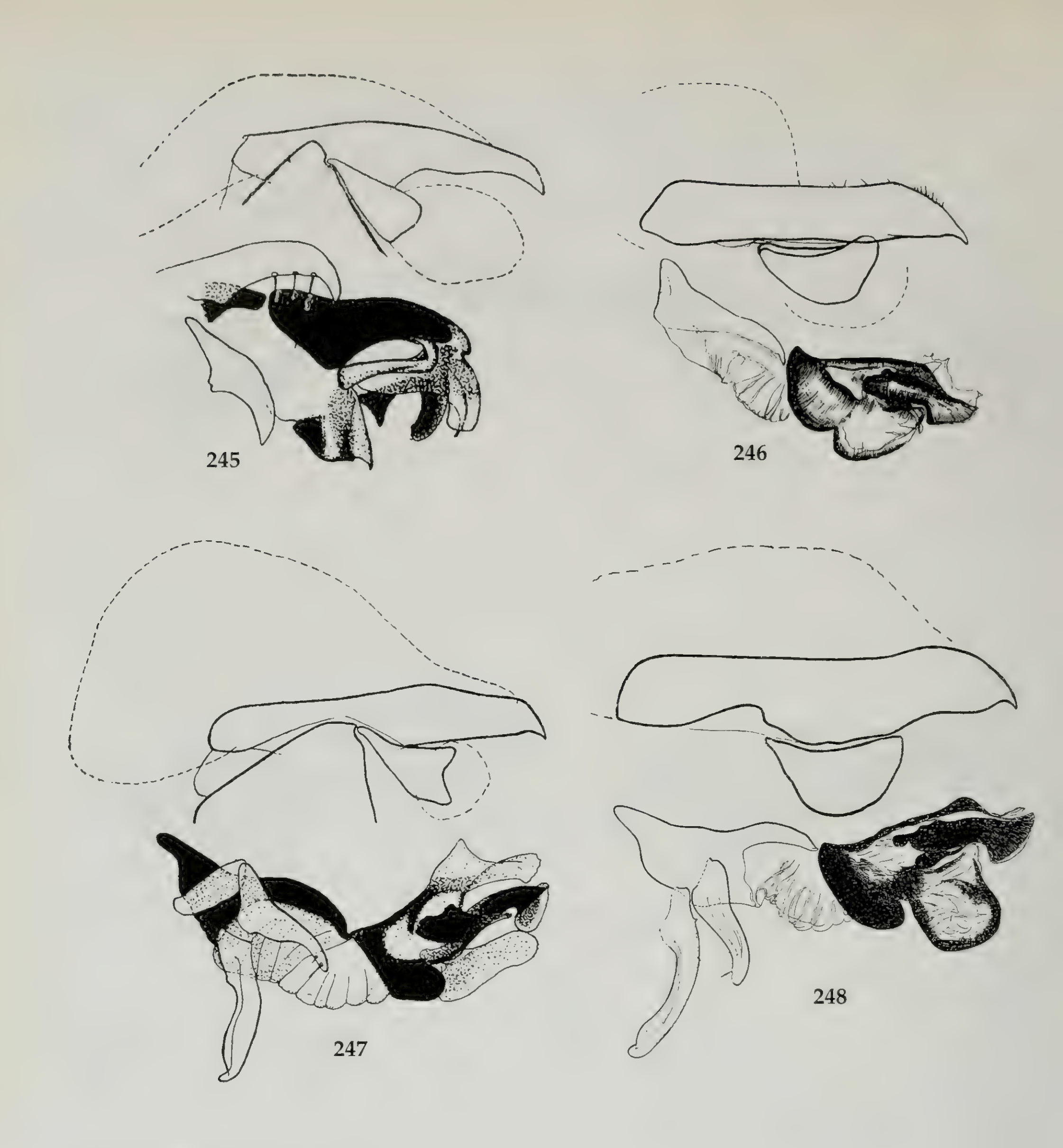
### *Sarcophaga moldavica* Rohdendorf, 1937

Fauna SSSR 19: 287 *(S. subvicina moldavica).*

*Sarcophaga congesta* Lehrer, 1967. Zool. Anz. 178: 213.
*Sarcophaga dispulata* Lehrer, 1967. ibid. 178: 216.

#### Description

♂. Frons at narrowest part 0.2-0.24, at vertex 0.23-0.27, at antennal base 0.36-0.41 head width; frontal vitta 2 times wider frontoventrally, frons middle 1.5-2 times wider than parafrontal; cercus

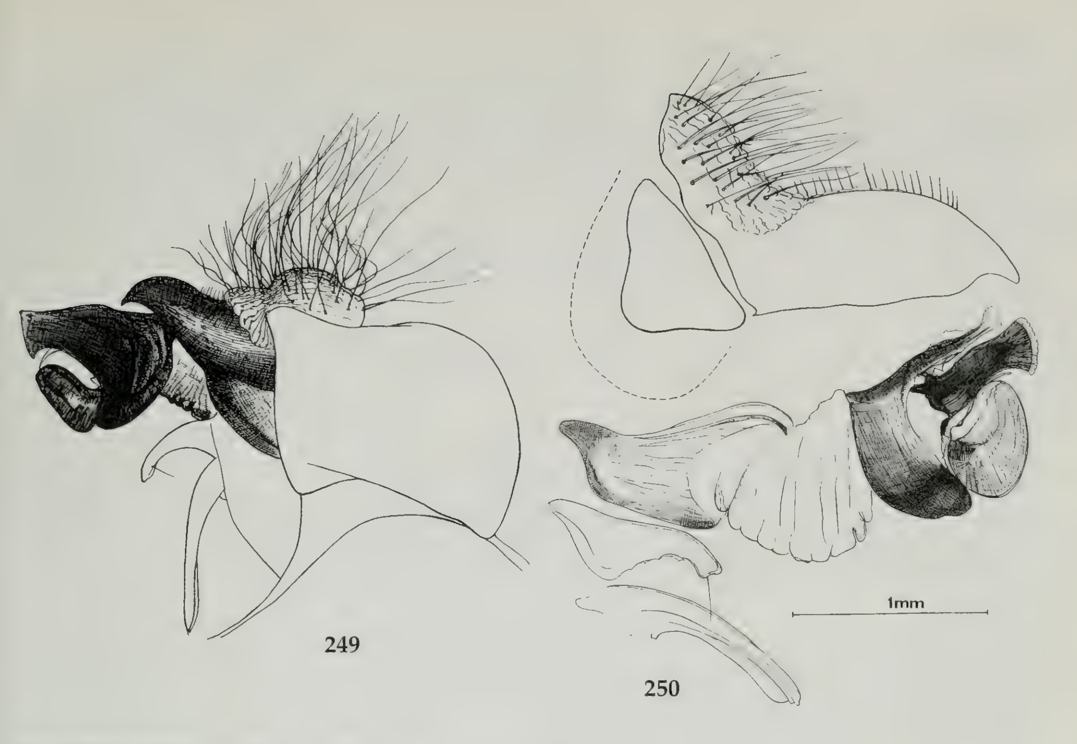



**Figs. 245.-246.** Male genitalia profile of:
**Fig. 245.** *Helicophagella inopinata*
**Fig. 246.** *Sarcophaga novaki*
**Fig. 247.** *Sarcophaga serbica*
**Fig. 248.** *Sarcophaga bachmayeri*

almost straight with small apical hooklet. Pregonite narrow, distinctly longer than postgonite. Paraphallus elongate, distinctly protruding ventrally; membranal lobes as long as broad with a well developed, short and narrow apical process; stylus almost parallel with longitudinal phallus axis, moderately curved ventrally, apex slightly wider; apical plate very narrow and medium-length, distinctly shorter than stylus (Fig. 235).

♀ unknown.

Body length 11-19 mm.




**Figs. 249.-250.** Male genitalia profile of:
**Fig. 249.** *Sarcophaga palavae* (genitalia of dried ♂ Holotype)
**Fig. 250.** *Sarcophaga palavae* (dissected genitalia of ♂ Paratype)

**Distribution:** Croatia, Bosnia and Hercegovina, Rumania, Hungary, Slovakia, Moldova, Ukraine. The species is essentially endemic in the Carpathian mountain system accompanying especially the natural dry forest(oak) stands at lower elevations.

## *Sarcophaga moravica* Povolný, 1986

Acta Mus. Morav. 71: 197.

### Description

♂. Frons at narrowest part 0.24, at vertex 0.25, at antennal base 0.42 head width; frontal vitta 1.2 times wider frontoventrally; frons middle 2.7 times wider than parafrontal; ratio between 3rd and 5th costal sections 1 : 0.7. Cercus apically distinctly saddle-shaped; pregonite very long, straight, longer than postgonite; membranal lobe very short with narrow basis, apical part wider and trilobate; stylus apex distinctly wider, forming nearly a right angle to longitudinal phallus axis; apical plate very short, wider and comparatively well sclerotized. (Fig. 243).

♀ unknown.

Only ♂ holotype known from Moravian Karst (Czechia).

## *Sarcophaga novaki* Baranov, 1941

Veter. Archiv 11 (9): 119 *(S. subvicina novaki).*
*Sarcophaga hennigi* Lehrer, 1978. Bull. Ann. Soc. r. ent. Belge 114: 127.

### Description

♂. Frons at narrowest part 0.19-0.22, at vertex 0.24-0.27, at antennal base 0.36-0.46 head width. Frontal vitta 1.2-2.5 × wider than parafrontal; ratio between 3rd and 5th costal sections 1 : 0.6-0.8. Cercus almost straight, apical hooklet medium-length; pregonite elongate and straight, longer than postgonite; paraphallus medium-sized, distinctly protruding ventrally; membranal lobes short and thick with short apically pointed process; ventral processes strongly sigmoid, with moderatly inflated base; stylus thick, apex distinctly wider, almost parallel with the longitudinal paraphallus axis; apical part membranous short and broad, with numerous dorsal spines (Fig. 246).

♀. Frons at narrowest part 0.31-0.32 head width; tergite VII consisting of a paired membranous haired plate.

Body length 10-19 mm.

**Distribution:** Austrian, Slovenian and Croatian Alps, Serbia. A montane (alpine) species inhabiting alpine zone near or above the timberline.

**Ecology:** Unknown.

## *Sarcophaga serbica* Baranov, 1930

Encycl. ent. B 2, Diptera (1929): 24.

### Description

♂. Frons at narrowest part 0.25-0.27, at vertex 0.32-0.34, at antennal base 0.45-0.5 head width; frontal vitta rather parallel-sided, frons middle 1.5-2 times wider than parafrontal; ratio between 3rd and 5th costal sections 1 : 0.6-0.7; cercus rather straight, apically moderately inflated dorsally, apical hooklet medium-sized; pregonite and postgonite of same length, but pregonite with obtuse tubercle in the middle of posterior edge; membranal lobe membranous, elongate, apex pointed or rounded, not reaching tip of stylus; stylus almost parallel with longitudinal phallus axis, apex wider and membranous, with rounded lateral lobes; apical plate same long as stylus, medium-width, without spines (Fig. 247).

♀ unknown.

Body length 6-16 mm.

**Distribution:** Plains of Serbia, Croatia, Romania, Hungary, eastern Slovakia, Ukraine and western Russia (environs of Moscow).

Flies prefer warm, moderately humid forests.

## *Sarcophaga subvicina* Rohdendorf, 1937

Fauna SSSR 19: 285 (nom nov. pro *Sarcophaga vicina* Villeneuve, 1899). Bull. Soc. Ent. France 27 (nom. preocc., nec Macquart 1835).

*Sarcophaga subvicina susteri* Lehrer, 1959. Beitr. Ent. 9: 901.

### Description

♂. Frons at narrowest part 0.22-0.25, at vertex 0.24-0.33, at antennal base 0.4-0.5 head width; frontal vitta wider frontoventrally, frons middle 1.5-2.5 times wider than parafrontal; ratio between 3rd and 5th costal sections 1 : 0.6-0.9. Cercus almost straight, with short apical hooklet; pregonite and postgonite of nearly same length; paraphallus small, poorly protruding ventrally; membranal lobe stout, long and broadly flap-shaped, interior margin more or less straight with a short rounded apical process. Stylus nearly parallel to longitudinal phallus axis, apically wider; apical plate medium-width, without spines (Fig. 239).

♀. Frons at narrowest part 0.31-0.35 head width. Abdominal tergite VII complete, very membranous, with several moderately long lateromarginals.

Body length 8-19 mm.

**Distribution:** Widely distributed in Europe from the British Isles to Ural and from Fennoscandia to southern Italy; north Caucasus, Tadjikistan.

**Ecology:** Larvae are parasitoids of earthworms (Kirchberg 1954, 1961), but have been reared in the laboratory from a dead slug *(Limax)* and on meat and liver (Pollock 1972, Baudet 1982, Blackith & Blackith 1984, Pape 1987b), corresponding to a similar feeding strategy of related species (*S. variegata, S. carnaria* etc.).

### *Sarcophaga ukrainica* Rohdendorf, 1937

Fauna SSSR 19: 288 *(S. subvicina ukrainica).*
*Sarcophaga baraschi* Lehrer, 1977. Bull. Soc. Ent. Mulhouse (1977): 13.

**Description**

♂. Frons at narrowest part 0.23-0.26, at vertex 0.25-0.34, at antennal base 0.38-0.52 head width. Frontal vitta 1.4-1.9 times wider frontoventrally, frons middle 1.5-2.5 times wider than parafrontal; ratio between 3rd and 5th costal sections 1 : 0.6-0.8. Cercus almost straight with short apical hooklet; pregonite distinctly longer than postgonite. Paraphallus medium-sized, protruding ventrally; membranal lobe with rather petiolate base, but essentially long, and broadly alate, extending to apex of stylus; stylus parallel to longitudinal paraphallus axis, moderately sigmoid, apically not wider; apical plate rather long and narrow, awl-shaped (Fig. 242).

♀ unknown.

Body length 9-16.5 mm.

**Distribution:** Serbia, Bulgaria, Romania, Hungary, southern and eastern Slovakia, Moldova, Ukraine. The species accompanies dry steppe habitats on mountain slopes of the Carpathian system as an endemic.

Biology is unknown.

### *Sarcophaga variegata* (Scopoli, 1763)

Ent. Carniol. 326 *(Musca).*
*Sarcophaga carnaria* auct., nec Linnaeus 1758.

**Description**

♂. Frons at narrowest part 0.2-0.27, at vertex 0.23-0.3, at antennal base 0.35-0.48 head width. Frontal vitta 1.2-2.2 times wider frontoventrally, frons middle 2-3 times wider than parafrontal; ratio between 3rd and 5th costal sections 1 : 0.6-0.9. Cercus almost straigth, with delicate apical hooklet. Pregonite distinctly longer than postgonite; paraphallus distinctly protruding ventrally; membranal lobe straight, elongate ovate, not reaching tip of stylus; stylus forms an angle of 100°-130° with the longitudinal paraphallus axis (Fig. 237).

♀. Frons at narrowest part 0.33-0.4 head width. Terminalia like in *S. carnaria.*

Body length 6-19 mm.

**Distribution:** Transpalaearctic, from the British Isles to Kamchatka.

**Ecology:** Maggots are parasitoids of earthworms (Eberhard & Steiner 1952, Kirchberg 1954, 1961, Pape 1987b), pupae of Lepidoptera (*Agrotis segetum, Lymantria monacha* /Baer 1921, Séguy 1941a/, *Dendrolimus pini* /Jermanševič 1970/, *Hyphantria cunea* /Nagy et al. 1953/, *Barathra brassicae* /Povolný & Verves 1987/), snail *Euparyphia pisana* (Berner 1960). The data on breeding this species from Orthoptera (Séguy 1941a) and on myiasis by this species in vertebrates (James 1947) should be reexamined. Larvae have been successfully bred in the laboratory on liver and meat (Sukhova 1951, Kirchberg 1954, Draber-Mońko 1971a). The flies show the same euryoecious tolerance as the larvae, occurring from low elevations up to mountain sites above timberline (Alps, Carpathians), frequently very common and tending towards culturophily.

### *Sarcophaga zumptiana* Lehrer, 1959

Beitr. Ent. 9: 899.
*Sarcophaga mouchajosefi* Lehrer, 1978. Bull. Soc. Ent. Mulhouse (1978) 1-3.

**Description**

♂. Frons at narrowest part 0.19-0.25, at vertex 0.24-0.33, at antennal base 0.37-0.48 head width; frontal vitta 1.4-2 times wider frontoventrally, frons middle 1.5-2.6 times wider than parafrontal; ratio between 3rd and 5th costal sections 1 : 0.5-0.8. Cercus almost straight, with small apical hooklet; pregonite distinctly longer than postgonite; paraphallus strongly protruding ventrally; membranal lobe shortly subtriangulate; stylus long and thick, apex distinctly wider, almost parallel with the longitudinal phallus axis; apical plate wide, with numerous dorsal spines (Fig. 241).

♀ unknown.

Body length 6-19 mm.

**Distribution:** Hungarian, Slovak, Moravian, Austrian, Rumanian, Ukrainian Carpathians. The species accompanies warm, natural oak and beech stands up to submontane elevations. It reaches its westernmost limits in Moravian Karst (north to Brno) and in the Mountains of Hainburg (east to Vienna) on the Danube.

Ecology unknown.

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## Appendix II

During the press of this paper several new data and some nomenclatural changes resulted from literature or from other sources. These additions are combined to the present appendix.

### Notes on bionomy

Subfamily Miltogrammatinae

First instar larvae of the genera *Senotainia, Taxigramma, Metopia, Paragusia* are usually deposited on decomposing corpses of such insects as wasps, bees, flies, crickets and orthopterans. In the abdomen of female *Metopia* usually only 6 or 7 larvae are capable of development and are usually stouter than the other ones which are obviously less active and not capable of successful development (Richet 1990, own experience).

Subfamily Sarcophaginae

In the genera *Ravinia, Bellieriomima, Helicophagella, Krameromyia, Pierretia, Sarcotachinella, Thyrsocnema, Heteronychia, Bercaea, Parasarcophaga, Liosarcophaga, Robineauella, Sarcophaga* the larvae may generally deveplop (and partly succesfully reared in laboratory) on beef meat on snails, insects including edaphic insect larvae (own experience and Richet 1990).

*Helicophagella hirticrus* was reared from dead swallows and from snails.

*Liosarcophaga teretirostris* was reared from *Helix nemoralis* (Richet 1990).

*Liosarcophaga jacobsoni* was reared from *Helix nemoralis* (Richet 1990).

*Sarcophila latifrons* was reared from *Helix nemoralis* (Richet 1990).

*Pierretia nigriventris* was reared from *Helix nemoralis* (Richet 1990).

*Krameromyia anaces* was reared from *Helix nemoralis* (Richet 1990).

### Nomenclatorial notes

Concerning the synonymy of taxa treated in this paper we refer the reader to the Catalogue of Palaearctic Sarcophagidae (Verves 1986), in which the essential synonyms of this group have been yet presented. The synonyms presented in this paper should only draw the attention either to such names which were frequently used in the past or which involve species of some special (e.g. economic) importance. Several new synonyms are also indicated.

Genus ***Xiphidiella*** Zumpt (South Africa) belongs to the Eumacronychiini of the subfamily Paramacronychiinae.

It results from Pape (1994) that *Blaesoxipha redempta* (Pand.) is a different species, known to occur only in France The correct name is:
***Blaesoxipha lapidosa*** Pape, 1994
Pape, 1994, Entomol. scand., suppl. 45: 37.
Holotype from Hungary

The correct spelling of the genus ***Mesomelaena*** Rd. is ***Mesomelena*** Rd.

### New and little known synonyms

***Metopia argentata*** Macquart, 1850
syn.: *Metopia roserii* Rondani, 1859, **syn.n.**
*Metopia stackelbergi* Rohdendorf, 1955, **syn.n.**

***Blaesoxipha lapidosa*** Pape, 1994
syn.: *Blaesoxipha redempta* Verves, 1990 (nec Pandellé, 1896) **syn.n.**
*Blaesoxipha lineata* auctorum (nec. Fallén, 1819.

***Metopodia pilicornis*** (Pandellé, 1895)
syn.: *Metopodia grisella* auctorum (nec Meigen, 1824).

***Heteronychia*** (s.str.) ***rohdendorfi*** (Povolný & Slamečková, 1959)
syn.: *Sarcophaga borodorf* Pape, 1996, **syn.n.** (unnecessary new name for *Pierretia rohdendorfi* Povolný & Slamečková, 1959).

***Heteronychia bulgarica*** (Enderlein, 1936)
syn.: *Pierretia boettcheriana* Rohdendorf, 1937

Genus ***Sarina*** Enderlein, 1928
Type species: *Sarcophaga nigrans* Pandellé, 1896 (*Musca sexpunctata* Fabricius, 1805)
syn.: *Arachnidomyia* Townsend, 1934 (Type species: *Sarcophaga davidsonii* Coquillett, 1892), **syn.n.**

Genus ***Myorhina*** Robineau-Desvoidy, 1830
Type species: *Myorhina campestris* Robineau-Desvoidy. 1830 (*Sarcophaga nigriventris*, Meigen, 1826).
syn.: *Pierretia* Robineau-Desvoidy, 1863 (type species: *Pierretia praecox* Robineau-Desvoidy, 1836) (*Sarcophaga nigriventris* Meigen, 1826).

***Myorhina*** (s.str.) ***soror*** (Rondani, 1860)
syn.: *Sarcophaga soror* Pape, 1995, **syn.n.** (unnecessary new name for *Sarcophaga soror* Rondani, 1860).

***Thyrsocnema kentejana*** Rohdendorf, 1937
syn.: *Thyrsocnema niculescui* Lehrer, 1994.

***Bercaea africa*** (Wiedemann, 1824)
syn.: *Sarcophaga cruentata* Meigen, 1824.

***Liosarcophaga*** (s.str.) ***parkeri*** (Rohdendorf, 1937)
syn.: *Sarcophaga aegyptica* auctorum (nec Salem, 1935).

***Sarcophaga cognata*** Rondani, 1860
syn.: *Sarcophaga lasiostyla* auctorum (nec Macquart, 1843).

Unclear nomenclatorial situation exists within the species *rosellei* Böttcher, 1912 – *novella* Baranov, 1929 – and *cepelaki* Lehrer, 1975 of the genus *Helicophagella* Enderlein, 1928 (s.str.).

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## Endangered species of flesh-flies

A serious problem involving the ecology of Sarcophagidae and especially of the flesh-flies (s.str. – Sarcophagini) is presented by the decline and/or withdrawal of several species (especially from the European Northwest to the Southeast). This process is mainly observed in some species accompanying the forest stands, but also certain stenoecious hygrophilic taxa (accompanying swamps and humid habitats) and stenoecious xerothermophilic (especially calciphilic) species are concerned. As for the species accompanying the lower elevation deciduous and mixed forests, no evidence exists of its exact start. It seems, however, that its dramatic phase has been started during the fifties of this century coinciding with the general forest degradation due to air pollution (especially acid rainfalls, heavy metal impact etc.) and mass application of insecticides. An analogous phenomenon of that time was observed especially in the butterflies (believed to represent a model group of the environmental disintegration). This phenomenon comprehended even species of which we know that they were rather common at the time of their description (Povolný 1988). Such examples are *Rosellea uliginosa* (Kram.), *Robineauella pseudoscoparia* (Kram.) recently followed by *Liosarcophaga tuberosa* (Pand.). The same decline seems to be less apparent in such species as *Kramerea schuetzei* (Kram.) or *Rosellea aratrix* (Pand.) possibly surviving at least in locally limited or little disturbed habitats. The next group of endangered stenoecious species are those accompanying lowland forests, natural humid habitats such

as swamps etc. These are especially *Ascelotella granulata* (Kram.), *Pierretia villeneuvei* (Bött.) and partly *Discachaeta pumila* (Meig.). Their habitats disappear especially with various kinds of water management and with the general destruction of swamps.

A different situation has developed within the group of thermophilic, partly subtropical or tropical taxa accompanying xeric and xerothermophilic habitats of the European lowgrounds, especially those of mediterranean facies. With the period of extremely hot and dried seasons (starting with the year 1947) occasional invasions of the mediterranean element were observed especially in Hungary and in its adjacent areas of southern Slovakia, southern Moravia and Lower Austria. Most important seems to be the case of the invasions of the blowfly species *Chrysomyia albiceps* (Wied.) which repeatedly invaded the above territory (but also Switzerland) during late fifties and repeatedly in seventies and eighties of our century. A similar invasion was observed in *Liosarcophaga tibialis* (Macq.) during the myxomatosis pandemic infestation which has decimated the populations of the rabbit (*Oryctolagus cuniculus* /L./) after the year 1950. The flies were mainly observed along the railways connecting Hungary with the Balkan countries (Romania, Bulgaria) where the synanthropic populations are permanently established. The next synanthropic flesh-fly of subtropical origin is *Liopygia crassipalpis* (Macq.) – a species which was known to occur near Vienna during the last decades of the 19th century. This species expands since the north and it reached the vicinity of Brno (southern Moravia) during the hot summer of 1995-1996. There exist, however, very characteristic representatives of the mediterranean element especially in limestone habitats of central Europe the presence of which there is not only autochthonous, but it represents at the same time the northern limits of their distribution there. These are such rare taxa as *Discachaeta amita* (Rond.), *D. cucullans* (Pand.) and *Heteronychia mutila* (Villn.). *Discachaeta cucullans* is known to occur in southern Moravia, *Heteronychia mutila* reaches its northern limit in southern Slovakia (Nitra) and *Discachaeta amita* is known from Hungary, all these three taxa representing true rarities. They are endangered by the destruction of their habitats (mainly limestone quarries. Some other calciphilic taxa – obvious rarities of which only limited knowledge exists so far – are seriously endangered (*Heteronychia infixa* /Bött./).

In some flesh-fly taxa also their monophagy or other specializations represent limiting factors of their existence. For instance *Arachnidomyia sexpunctata* (Fabr.) is endangered in its entire vast distributional area representing a specialized feeder (predator) of egg cocoons of great spiders.

These few examples are a serious indication that the so-called "Red lists" of endangered animals are insufficient as long as they do not include the protection of habitats of the endangered species. Such formal, more or less purely "administrative" protection is ineffective in most cases and it attracts frequently attention of individuals concentrating on collecting of endangered taxa. It is obvious that several taxa of the flesh-flies fulfil all preconditions to be registered as endangered insect species.

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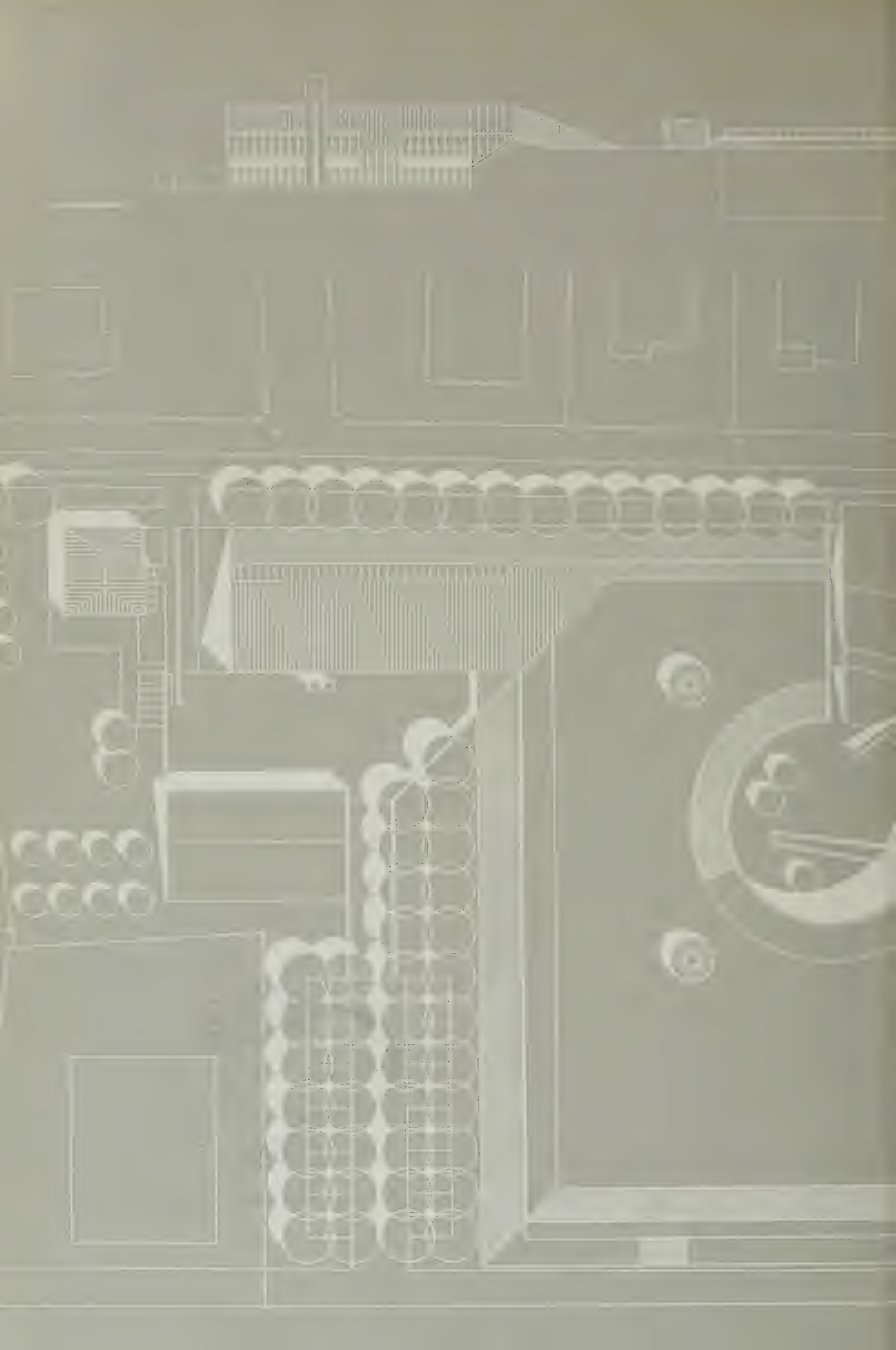
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# Revision of the *carpetana*-group of *Phyllodromica* Fieber from Spain, Portugal and France

(Insecta, Blattaria, Blatellidae, Ectobiinae)

Horst Bohn



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**(Insecta, Blattaria, Blattellidae, Ectobiinae)**

**Horst Bohn**



Weibchen von *Phyllodromica carpetana* (Bolívar)
Abbildung aus der Erstbeschreibung von Bolívar (1873)

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# Revision of the *carpetana*-group of *Phyllodromica* Fieber from Spain, Portugal and France

(Insecta, Blattaria, Blattellidae, Ectobiinae)

Horst Bohn

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# Revision of the *carpetana*-group of *Phyllodromica* Fieber from Spain, Portugal and France

**(Insecta, Blattaria, Blattellidae, Ectobiinae)***

**Horst Bohn**

Bohn, H. (1999): Revision of the *carpetana*-group of *Phyllodromica* Fieber from Spain, Portugal and France. (Insecta, Blattaria, Blattellidae, Ectobiinae). – Spixiana Suppl. **25**: 1-102

The *carpetana*-group of *Phyllodromica* is a group of closely related species endemic to the Iberian peninsula. It comprises 3 known species: *P. carpetana* (Bolívar), *P. moralesi* Fernandes, *P. sacarraoi* Fernandes, and 21 new species: *P. septentrionalis, P. delospuertos, P. isolata, P. laticarinata, P. javalambrensis, P. sulcata, P. clavisacculata, P. tenebricosa, P. brevisacculata, P. globososacculata, P. porosa, P. barbata, P. acuminata, P. lativittata, P. rhomboidea, P. acuminata, P. bolivariana, P. tenuirostris, P. crassirostris, P. atlantica,* and *P. fernandesiana.*

The revision contains the characterization of the group, considerations about its relationship with other groups, descriptions and pictures of all species and their distribution, a key for the determination of the males, and a cladogram showing the assumed phylogenetic relationships between the species.

Prof. Dr. Horst Bohn, Zoologisches Institut der Universität, Karlstr. 23, D-80333 München, Germany

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## Introduction

The *carpetana*-group of *Phyllodromica* is a group of closely related species endemic to the Iberian peninsula but widely distributed within this area. As defined here, the group comprises 3 known species: *P. carpetana* (Bolívar), *P. moralesi* Fernandes, and *P. sacarraoi* Fernandes, which were formerly placed in two different subgenera, the first in *Lobolampra*, the latter two in *Phyllodromica* s.str.. 21 species are described as new.

The late discovery of many of the species is not astonishing considering the great similarity between them. The main distinguishing features of the males, the tergal glands of tergites 7 and 8, are usually completely hidden below the overlapping tergites and only visible after unnatural stretching or during preparation. Moreover, because of the short lifespan of the males mostly females, which are almost indistinguishable, had been collected. The entomology collection of the Museo nacional de historia natural de Madrid contained 85 specimens from 43 localities; males from only 14 localities were represented.

Personal collectings soon revealed an unexpectedly high species diversity within the *carpetana*-group. In order to cover the group as completely as possible thorough collectings in various regions of the Iberian peninsula were undertaken finally comprising about 500 localities covering most montane regions in Spain and Portugal. Though there are still some regions which are not or not sufficiently investigated the collected material certainly includes the majority of the species of this group giving a solid base for the present revision.

## Methods, depositories, localities, and abbreviations

### Preparation

The specimens collected by the author are preserved in 5% formaldehyde.

The light microscopic photographs were made from slide preparations of KOH-treated cuticular structures mounted in Canada Balsam. Because of the high similarity of most species at least one, often

more, representatives per species and locality were prepared and studied.

For scanning electron microscopy (SEM) the abdominal tergites were also treated with KOH, after washing transferred to acetone, dried on a Polaron E3000 CP dryer from CO2, mounted on alumium stubs with adhesive carbon tabs, and sputtered with gold in a BioRad SEM coating system and then inspected with a Philips XL 20 SEM at 10-12 kV.

For the histological sections the formalin fixed tissues were dehydrated, embedded in Durcopan, cut with a glass knife (1 µm) on a RMC ultrotome III, stained with Richardson`s, and mounted with Eukitt on microscopic slides.

**Figures**

In several cases the species as defined here show a great variability between different localities. Future studies might suggest a further splitting into different subspecies or even species. In order to allow a clear identification of the species by other workers, the type specimens were dissected completely and mounted on microscope slides, and photographs of all relevant cuticular structures were taken. In few cases, when either a part had been damaged during preparation, or had an unsuitable position for photographing the respective figures of the type were replaced by those of a similar specimen.

In some cases the dark pigmentation of the tergite surface did not allow a photographic reproduction of the glandular pits of T7 and T8. An artificial bleaching of the type specimens necessary for a better depiction of the gland structures seemed inapt. In these cases other specimens with naturally or artificially (prolonged treatment with KOH) lighter pigmentation had to be used to demonstrate the species specific structures of the glandular pits. The bleaching is always mentioned in the figure captions.

In the figures the objects are usually depicted in dorsal view with anterior end on top. There is one exception: The hook of the left phallomere is shown with the posterior end on top.

The photographs of a given species (beginning with Fig. 9) are usually arranged in two plates. The first plate shows pictures of the thoracic segments of male and female (left row) and SEM pictures of male tergites 7 and 8 (right row). In both cases deviations from the natural conditions have to be taken into consideration. The pronotum during mounting may become slightly deformed; in contrast to what is seen in most pictures the anterior border of the pronotum normally is well rounded. In the SEM pictures the shape of the segments very much depends on the angle under which it is scanned. The outline of a segment (for example, depth of excavation of the posterior border) is therefore better realized on the light microscopic reproductions of plate 2.

In the second plate are depicted: T5 of the female and T5-10 of the male (usually left row); phallomere structures (hook) of the male (upper right corner); subgenital plate of the male (lower right corner); details of the male glandular pits of T7 and T8 (sometimes also on the first plate) and forewings of male and female (remaining pictures in the median part of the plate).

T5 of male and female (which is usually larger than the male) are brought to about the same size and thus reproduced in different enlargement. The wings of male and female are reproduced in identical enlargement; in species with shorter wings they have the same enlargement as the male tergites, in species with longer wings they have the same enlargement as the female T5.

Because of the mostly consistent arrangement of the various structures on the plates a consequent citing of the figure numbers in the text seemed unnecessary. I have restricted it to the descriptions of the T7 and T8 glandular structures, where often extra photographs are shown, and to those cases in which different alternatives have to be demonstrated.

**Females**

Because of the difficulty in specifying females special care was taken in selecting the specimens for figures and description: Only those females were used which either had been found in copula with an identifiable male, or which were from localities where only one species had been found.

The scarcity of distinguishing characters does not allow the presentation of a determination key for the females. In connection with the distribution maps a fairly reliable determination is possible in most cases. In the descriptions the accompanying species are always mentioned and the differences between the females – if present – specified.

Localities at which only females had been found are specifically marked: in the material lists by the addition of (♀) behind the locality number, in the distribution maps (Figs 3-6) by a specific symbol. The

determination of the female specimens has to be considered with some reservation; it is fairly reliable only under the assumption that the distribution areas of the species do not deviate too much from the picture shown in this paper. Undeterminable female material is listed on p. 100 after the descriptions.

### Material

The investigation was mainly based on material from two collections: The collection of the Museo nacional de historia natural de Madrid (MNHNM) and the author's own collection obtained during several trips through Spain and Portugal. A few specimens were also from the Museum national de Histoire naturelle de Paris (MNHNP) and from the Museum Alexander König in Bonn (MAKB).

The holotypes of the newly described species are deposited in the Madrid Museum.

### List of localities, identification of specimens

The locality data of the material collected by the author are presented here in full length. In the text the localities will be mentioned only by their indices consisting of an abbreviation of the country (Sp, Po, F) and the locality number. Subsequent collectings at the same locality are marked with small letters behind the number (a, b etc.). Example for the locality citing in the material section: Sp 12 (a) means that animals were collected at Sp 12 and 12a; Sp 12a means that animals were collected only at 12a.

Further explanations of the locality labels:

| | |
|---|---|
| "9 km SE place 1": | 9 km (by road!) SE of place 1 |
| "btw. place 1 & place 2": | approximately in the middle between place 1 and place 2 |
| "place 1 – place 2": | somewhere on the way between the two places |

Specimens used for microscopic preparations (slides, SEM) and photographs have an identification number consisting of the locality index and – separated by a diagonal – an individual number. Specimens grown from a larva are additionally marked by the underlining of the locality number (s. figure captions).

The listing of Portuguese districts and Spanish provinces under descriptions/material are arranged geographically from north to south and from west to east.

#### Spain (Sp)

| | |
|---|---|
| 4 | Prov. Soria, Pto. Esteras (S Medinaceli), 1000 m, 12.VIII.1983 |
| 5 | Prov. Madrid, 2 km NE Miraflores de la Sierra (N Madrid), 1200 m, 11.VIII.1983 |
| 5a | Prov. Madrid, 2 km NE Miraflores de la Sierra (N Madrid), 1200 m, 1.VI.1985 |
| 6a | Prov. Madrid, Pto. de la Morcuera (W Miraflores d. l. Sa., N Madrid), 1600-1780 m, 1.VI.1985 |
| 7 | Prov. Madrid, S. de Guadarrama, Pto. de Peñalara, 2200 m, 13.VIII.1983 |
| 11 | Prov. Ciudad Real, Campo de Montiel, 10 km NNE Villahermosa, 950 m, 17.VIII.1983 |
| 11a | Prov. Ciudad Real, Campo de Montiel, 10 km NNE Villahermosa, 900 m, 3.VI.1985 |
| 12 | Prov. Albacete, Sa. de Alcaraz, ca. 2 km NNW Pto. del Barrancazo, 1200 m, 17.VIII.1983 |
| 12a | Prov. Albacete, Sa. de Alcaraz, ca. 2 km NNW Pto. del Barrancazo, 1200 m, 3.VI.1985 |
| 13 | Prov. Albacete, Sa. de Alcaraz, ca. 4 km ESE Pto. del Barrancazo, 1200 m, 17.VIII.1983 |
| 13a | Prov. Albacete, Sa. de Alcaraz, ca. 4 km ESE Pto. del Barrancazo, 1200 m, 3.VI.1985 |
| 14a | Prov. Albacete, Sa. de Alcaraz, Pto. de las Crucetillas, 1450 m, 17.VI.1991 |
| 15 | Prov. Albacete, Sa. de Alcaraz, near Riópar (SW Pto. de las Crucetillas), 1200 m, 18.VIII.1983 |
| 16 | Prov. Jaén, Sa. de Segura, Siles – Los Arroyos, 1000-1500 m, 18.VIII.1983 |
| 16a | Prov. Jaén, Sa. de Segura, Siles – Los Arroyos, 1000-1500 m, 17.VI.1991 |
| 17a | Prov. Jaén, Sa. de Cazorla, Emb. del Tranco, near Bujaraiza, 700 m, 19.VI.1984 |
| 18a | Prov. Jaén, Sa. de Cazorla, Pto. de las Palomas (NE Cazorla), 1300 m, 18.VI.1984 |
| 19 | Prov. Jaén, Sa. de Cazorla, 5 km S Puente de las Herrerías, 1300 m, 20.VIII.1983 |
| 19a | Prov. Jaén, Sa. de Cazorla, 5 km S Puente de las Herrerías, 1300 m, 18.VI.1984 |
| 20 | Prov. Jaén, Sa. de Pozo, W slope of Mt. Cabañas, 1600 m, 20.VIII.1983 |
| 24a | Prov. Almería, Sa. de los Filabres, 5 km SW Observatorio del Calar Alto, 2000 m, 12.VI.1984 |
| 28 | Prov. Granada, Sierra Nevada, Pto. de la Ragua, 1993 m, 23.VIII.1983 |
| 28a | Prov. Granada, Sierra Nevada, Pto. de la Ragua, 1993 m, 12.VI.1984 |
| 32a | Prov. Granada, Sierra Nevada, S slope of Mulhacén, Loma de Piedra Blanca, 2100-2350 m, 16.VI.1984 |
| 32b | Prov. Granada, Sierra Nevada, S slope of Mulhacén, Loma de Piedra Blanca, 2100-2350 m, 12.VI.1991 |
| 33 | Prov. Granada, Sierra Nevada, S slope of Mulhacén, Loma de Piedra Blanca, 2600 m, 25.VIII.1983 |
| 33a | Prov. Granada, Sierra Nevada, S slope of Mulhacén, Loma de Piedra Blanca, 2600 m, 16.VI.1984 |

33b Prov. Granada, Sierra Nevada, S slope of Mulhacén, Loma de Piedra Blanca, 2600 m, 11.VI.1991
35 Prov. Granada, Sierra Nevada, Solynieve (Sierra Nevada), 2250 m, 25.VIII.1983
36 Prov. Granada, Sierra Nevada, Collado de las Sabinas, 2000 m, 25.VIII.1983
36a Prov. Granada, Sierra Nevada, Collado de las Sabinas, 2000 m, 14.VI.1984
65 Prov. Granada, Sierra Nevada, 2 km NE Tocón (NE Granada), 1300 m, 13.VI.1984
66 Prov. Granada, Sierra Nevada, Solynieve (Sierra Nevada) – Pinos Genil, 1750 m, 14.VI.1984
67 Prov. Granada, Sierra Nevada, Solynieve (Sierra Nevada) – Pinos Genil, 1500 m, 14.VI.1984
71a Prov. Granada, Sierra Nevada, Pto. de la Mora (NE Granada), 1390 m, 9.VI.1989
73 Prov. Jaén, Sa. de Pozo, 2 km S slope of Mt. Cabañas, 1700 m, 18.VI.1984
74 Prov. Jaén, Sa. de Cazorla, 6 km SSW Cotorrios, 800 m, 18.VI.1984
81 Prov. Logroño, Sa. de la Demanda, above Anguiano, 900 m, 30.V.1985
82 Prov. Logroño, Sa. de la Demanda, 3 km SW Anguiano, 700 m, 30.V.1985
83 Prov. Logroño/Burgos, Sa. de la Demanda, 5 km W Canales, 1200 m, 30.V.1985
84 Prov. Burgos, 2 km E Santo Domingo de Silos, 1000 m, 31.V.1985
84a Prov. Burgos, 2 km E Santo Domingo de Silos, 1000 m, 5.V.1992
84b Prov. Burgos, 2 km E Santo Domingo de Silos, 1000 m, 13.V.1996
86 Prov. Segovia/Madrid, Sa. de Guadarrama, Pto. de Navafría, 1700 m, 31.V.1985
87 Prov. Madrid, Sa. de Guadarrama, btw. Pto. de Navafría & Lozoya, 1400 m, 31.V.1985
88 Prov. Madrid, 4 km SSW Robledo de Chavela (NE S. Martín de Valdeiglesias), 900 m, 1.VI.1985
90 Prov. Madrid/Toledo, 9 km SE San Martín de Valdeiglesias, 700 m, 2.VI.1985
95 Prov. Cuenca, 20 km SW Cuenca (Carret. N 420), 900 m, 5.VI.1985
96 Prov. Cuenca, Serranía de Cuenca, 2 km NNW La Ciudad Encantada, 1300 m, 5.VI.1985
97 Prov. Cuenca, Serranía de Cuenca, Embalse de la Toba, 1100 m, 5.VI.1985
98 Prov. Cuenca, Serranía de Cuenca, 8 km WSW Pto. de El Cubillo, 1400 m, 5.VI.1985
99 Prov. Teruel, Montes Universales, 5 km W Frías de Albarracín, 1600 m, 5.VI.1985
99a Prov. Teruel, Montes Universales, 5 km W Frías de Albarracín, 1600 m, 2.VI.1997
100 Prov. Teruel, 10 km SE Albarracín, 1400 m, 6.VI.1985
121 Prov. Navarra, Sa. de Urbasa, 3 km W Pto. de Urbasa (20 km NW Estella), 700 m, 25.V.1986
122 Prov. Burgos, Sotovellanos (30 km S Aguilar de Campóo), 850 m, 25.V.1986
123 Prov. Palencia, near Mave (8 km S Aguilar de Campóo), 850 m, 26.V.1986
124 Prov. Palencia, Embalse de la Requejada (near Cervera d. P.), 1100 m, 26.V.1986
125 Prov. Palencia, Pto. de Piedrasluengas (ca. 50 km N Cervera d. P.), 1300 m, 26.V.1986
127 Prov. Cantabria, Picos de Europa, btw. La Vega & Enterrias, 600 m, 26.V.1986
129 Prov. Cantabria/León, Picos de Europa, Pto. de San Glorio, 1600 m, 27.V.1986
130 Prov. León, Picos de Europa, 3 km W Llánaves de la Reina, 1300 m, 27.V.1986
131 Prov. León/Palencia, Alto de las Portillas (6 km N Guardo), 1250 m, 27.V.1986
132 Prov. Palencia, Emb. de Compuerto (4 km NE Otero de Guardo), 1300 m, 27.V.1986
133 Prov. Palencia, Membrillar (ca. 30 km NNW Carrión d. los Condes), 1000 m, 27.V.1986
134 Prov. Palencia, 5 km ENE Villaeles de Valdavia (40 km N Carrión d. los Condes), 900 m, 27.V.1986
135 Prov. Burgos, 3 km E Sarracín (S Burgos), 900 m, 28.V.1986
136 Prov. Soria, 10 km W Abejar (30 km W Soria), 1100 m, 28.V.1986
137 Prov. Soria, 2 km E Abejar (30 km W Soria), 1100 m, 28.V.1986
137a Prov. Soria, 2 km E Abejar (30 km W Soria), 1100 m, 14.V.1996
138 Prov. Zaragoza, Sa. del Moncayo, below Santuario del Moncayo, 1400 m, 29.V.1986
152 Prov. León, btw. Almanza & Mondreganes (N Sahagún), 900 m, 8.VI.1987
153 Prov. León, Sotillos (12 km NW Cistierna), 1200 m, 8.VI.1987
154 Prov. León, Sa. de los Fuentes de Invierno, Isoba (SE Pto. de San Isidro), 1500 m, 9.VI.1987
155 Prov. Oviedo, Sa. de los Fuentes de Invierno, 6 km NW Pto. de San Isidro, 1400 m, 9.VI.1987
156 Prov. Oviedo, Collado de la Cobertoria (W Pola de Lena), 1000-1170 m, 9.VI.1987
157 Prov. León/Oviedo, Puerto Ventana (SW Pola de Lena), 1500 m, 10.VI.1987
158 Prov. León, Villasecino (NW Emb. de los Barrios de Luna), 1100 m, 10.VI.1987
159 Prov. León, 3 km NW Villafranca del Bierzo (WNW Ponferrada), 500 m, 10.VI.1987
160 Prov. Lugo, btw. Pedrafita do Cebreiro & Cebreiro (SW Pto. de Pedrafita do C.), 1000 m, 11.VI.1987
161 Prov. Lugo, btw. Cebreiro & Linares (SW Pto. de Pedrafita do Cebrieiro), 1000 m, 11.VI.1987
162 Prov. Lugo, 10 km NNE Quiroga, 900 m, 11.VI.1987
163 Prov. Orense, btw. Cambela & Alto de Covelo (S A Rúa), 1000 m, 11.VI.1987
164 Prov. Zamora, Padornelo (W Puebla de Sanabria), 1300 m, 11.VI.1987
165 Prov. Zamora, Sa. de la Cabrera, 5 km N San Martín de Castañeda, 1700 m, 11.VI.1987
166 Prov. Zamora, Sa. de la Cabrera, 5 km ESE San Martín de Castañeda, 1000 m, 12.VI.1987
167 Prov. Zamora, Sa. de la Culebra, San Pedro de las Herrerias (25 km N Alcañices), 900 m, 12.VI.1987

170 Prov. Salamanca, Sa. de la Peña de Francia, surr. of El Cabaco, 900-1100 m, 13.VI.1987
171 Prov. Salamanca, Sa. de la Peña de Francia, Peña de Francia, 1400-1700 m, 13.VI.1987
171a Prov. Salamanca, Sa. de la Peña de Francia, Peña de Francia, 1400-1700 m, 26.IV.1992
172 Prov. Salamanca, Sa. de la Peña de Francia, El Portillo (near La Alberta), 1150 m, 14.VI.1987
172a Prov. Salamanca, Sa. de la Peña de Francia, El Portillo (near La Alberta), 1150 m, 25./26.IV.1992
173 Prov. Salamanca/Cáceres, 9 km NW Vegas de Coria (near Emb. de Gabriel y Galán), 400 m, 14.VI.1987
173a Prov. Salamanca/Cáceres, 9 km NW Vegas de Coria (near Emb. de Gabriel y Galán), 400 m, 25.IV.1992
174 Prov. Salamanca, Lagunilla (SW Béjar), 900 m, 14.VI.1987
174a Prov. Salamanca, Lagunilla (SW Béjar), 900 m, 25.IV.1992
175 Prov. Cáceres, Montes de Tras la Sierra (NE Plasencia), Pto. de Honduras, 1200-1450 m, 15.VI.1987
175a Prov. Cáceres, Montes de Tras la Sierra (NE Plasencia), Pto. de Honduras, 1200-1450 m, 25.IV.1992
176 Prov. Cáceres/Avila, Pto. de Tornavacas (ca. 50 km NE Plasencia), 1280 m, 15.VI.1987
176a Prov. Cáceres/Avila, Pto. de Tornavacas (ca. 50 km NE Plasencia), 1280 m, 25.IV.1992
177 Prov. Avila, Sa. de Villafranca, NW Pto. de la Peña Negra, 1700 m, 15.VI.1987
178 Prov. Avila, Sa. de Gredos, 3 km W Hoyos del Collado (NW Arenas de S. Pedro), 1300 m, 15.VI.1987
179 Prov. Avila, Sa. de Gredos, 5 km SE Hoyos del Espino (NNW Arenas de S. Pedro), 1300 m, 16.VI.1987
180 Prov. Avila, Sa. de Gredos, 10 km SSW Hoyos del Espino (NW Arenas de S. Pedro), 1500 m, 16.VI.1987
181 Prov. Avila, Sa. de Gredos, Pto. del Pico (NE Arenas de S. Pedro), 1360 m, 16.VI.1987
181a Prov. Avila, Sa. de Gredos, Pto. del Pico (NE Arenas de S. Pedro), 1360 m, 24.IV.1992
182 Prov. Avila, Sa. de Gredos, Pto. de Casillas (W S. Martín d. Vald.), 1480 m, 17.VI.1987
182a Prov. Avila, Sa. de Gredos, Pto. de Casillas (W S. Martín d. Vald.), 1480 m, 23.IV.1992
183 Prov. Avila, Sa. de Guadarrama, 3 km NW El Hoyo de Pinares (SE Avila), 1000 m, 17.VI.1987
184 Prov. Avila, Sa. de Guadarrama, 4-8 km SW Pto. de Guadarrama, 1500-1700 m, 17./18.VI.1987
185 Prov. Segovia/Guadalajara, Sa. de Ayllón, Collado de la Quesera, 1700 m, 18.VI.1987
191 Prov. Almería, Sierra Alhamilla, btw. Mts. Colativí & Sa. Alhamilla, ca. 1200 m, 15.V.1989
202 Prov. Granada, Sa. de la Sagra, btw. Puebla de Don Fadrique & Cortijos Nuevos de la Sierra, 1300 m, 5.IV.1991
225 Prov. Salamanca, Villasrubias (33 km SSW Ciudad Rodrigo), 900 m, 23.IV.1991
226 Prov. Salamanca/Cáceres, Sa. de Gata, Pto. de Perales (ca. 40 km SSW Ciudad Rodrigo), 950 m, 23.IV.1991
227 Prov. Salamanca/Cáceres, Sa. de Gata, btw. Navasfrias & Valverde del Fresno, 1000-1100 m, 23.IV.1991
233 Prov. Cáceres, Sa. de Guadalupe, btw. Eremita del Humilladero & Mt. Villuercas (near Guadalupe), 1100 m, 25.IV.1991
235 Prov. Almería, Sa. de Gádor, N slope of Mt. Dos Hermanos, 1700-1950 m, 6.VI.1991
237-241 Prov. Almería, Sierra Nevada, N slope of Mts. Buitre & Polarda (S Fiñana – Abrucena), 1400-1800 m, 7.VI.1991
242 Prov. Granada, Sierra Nevada, N slope of Mt. Chullo (N Bayárcal), 2000-2150 m, 7./8.VI.1991
243 Prov. Almería, Sierra Nevada, E slope of Mt. Chullo (N Bayárcal), 2400-2600 m, 8.VI.1991
244 Prov. Almería, Sierra Nevada, Loma de la Majada de las Vacas (NW Laujar de Andarax), 1650-2200 m, 8./9.VI.1991
245 Prov. Granada, Sierra Nevada, Barranco del Hornillo (N Laroles), 2000 m, 9.VI.1991
246 Prov. Granada, Sierra Nevada, SW slope of Mt. Morron (N Mecina – Alfahar), 2050-2550 m, 9.VI.1991
247 Prov. Granada, Sierra Nevada, Loma del Riachuelo (N Mecina Bombarón), 2150-2600, 10.VI.1991
249 Prov. Granada, Sierra Nevada, Rio Lanjarón (above Lanjarón), 1900 m, 12.VI.1991
254 Prov. Granada, Sierra Nevada, Barranco La Solana (ENE Guejar – Sierra), 1800-1900 m, 14./15.VI.1991
259 Prov. Almería, Sa. de los Filabres, near Observatorio del Calar Alto, 2000 m, 16.VI.1991
260 Prov. Granada, Sa. de la Sagra, Collado Blanco, 1650 m, 16.VI.1991
261 Prov. Granada, Sa. de Segura: Sa. de Guillimona, 3 km N La Losa, 1700 m, 16.VI.1991
262 Prov. Jaén, Sa. de Segura: Sa. de Almorchón, 4 km WNW Santiago de la Espada, 1700 m, 16.VI.1991
263 Prov. Jaén, Sa. de Segura: Sa. de Almorchón, 4 km ESE Pontones, 1600 m, 16.VI.1991
264 Prov. Albacete, Sa. de Alcaraz, Pto. del Arenal, 1150 m, 17.VI.1991
265 Prov. Tarragona, surr. of Los Puertos (ca. 20 km W Tortosa), 750-1400 m, 11.IV.1992
266 Prov. Castellón, Pto. de Querol (50 km W Vinarós), 1030 m, 11.IV.1992
268 Prov. Castellón, btw. Cinctorres & Portell de Morella (SW Morella), 1200 m, 12.IV.1992
269 Prov. Teruel, Sa. del Rayo, btw. Cantavieja & Mosqueruela, 1500 m, 12.IV.1992
269a Prov. Teruel, Sa. del Rayo, btw. Cantavieja & Mosqueruela, 1500 m, 17.IV.1995
270 Prov. Teruel, Sa. de Nogueruelas, 16 km NNE Rubielos de Mora, 1600 m, 12.IV.1992
272 Prov. Teruel, Sa. de Javalambre, btw. Collado de El Gavilán & Mt. Javalambre, 1600 m, 13.IV.1992
274 Prov. Cuenca, Sa. de Mira, Mt. Rebollo, 1250 m, 13.IV.1992
278 Prov. Murcia, Sa. de Taibilla, Mt. Revolcadores, 1450-1550 m, 15.IV.1992
279 Prov. Granada, Sa. de la Hoya del Espina, Pto. del Pinar, 1500-1600 m, 15.IV.1992

280 Prov. Almería, btw. Casablanca & María (NW Vélez Rubio), 1200 m, 15.IV.1992
282 Prov. Almería, S. de Maria, ca. 4 km N Chirivel (W Vélez Rubio), 1400 m, 16.IV.1992
283 Prov. Granada/Almería, Sa. de Lucar, btw. Oria & Cúllar Baza, 1200 m, 16.IV.1992
285 Prov. Jaén, Sa.de Alta Coloma, Mt. Cerro Quemado, 1150-1450, 17.IV.1992
287 Prov. Jaén, Sa. Almadén, btw. Mancha Real & Mt. El Almadén, 1300-1550 m, 18.IV.1992
290 Prov. Ciudad Real, Sa. de la Garganta, 3 km S Pto. Valderrepisa (SW Puertollano), 850 m, 20.IV.1992
291 Prov. Ciudad Real, Sa. del Rey, Mt. Chorreras (SW Puertollano), 1050 m, 20.IV.1992
294 Prov. Ciudad Real, Mtes. del Toledo, Sa. de los Torneros, Mt. Becerra, 1300 m, 21.IV.1992
295 Prov. Toledo, Mtes. de Toledo, Mt. Corral de Cantos (10 km S Navahermosa), 1000 m, 22.IV.1992
296 Prov. Toledo, Sa. de San Vicente (NE Talavera), 2 km N El Real de San Vicente, 900 m, 22.IV.1992
297 Prov. Toledo, Sa. de San Vicente (NE Talavera), Mt. San Vicente, 1250-1350 m, 23.IV.1992
298 Prov. Ávila, Sa. de Gredos, near Cassillas (18 km W San Martín d. V.), 1200 m, 23.IV.1992
299 Prov. Ávila, Sa. de Gredos, btw. Mijares & Pto. de Mijares (W Piedralaves), 1200-1570 m, 23.IV.1992
301 Prov. Ávila, Sa. de la Paramera, Pto. de Navalmoral, 1450-1500 m, 24.IV.1992
303 Prov. Ávila, Sa. de la Paramera, 3 km W Navalacruz, 1300 m, 24.IV.1992
304 Prov. Ávila, Sa. de la Paramera, Pto. de Menga, 1560 m, 24.IV.1992
305 Prov. Cáceres, Sa. de Gredos, near Guijo de Sta. Bárbara (N Jarandilla d. L.V.), 800-900 m, 24.IV.1992
306 Prov. Cáceres, Pto. del Piornal (NE Plasencia), 1200 m, 24./25.IV.1992
307 Prov. Salamanca, btw. El Cubo de Don Sancho & Traguntía (W Salamanca), 800 m, 26.IV.1992
308 Prov. Orense, btw. Vilamea & Fondevila (ca. 40 km S Celanova), 500 m, 30.IV.1992
309 Prov. Pontevedra, Parque natural del Monte Alhoya (near Tui), 400-600 m, 1.V.1992
310 Prov. Pontevedra, near Portela (20 km N Pontevedra), 200 m, 1.V.1992
311 Prov. La Coruña, near Villar da Torre (5 km NE Negreira), 400 m, 1.V.1992
313 Prov. La Coruña, 4 km S Susana (13 km SE Santiago d. C.), 200 m, 2.V.1992
314 Prov. Pontevedra, near Toboada (14 km NW Lalín), 500 m, 2.V.1992
315 Prov. Pontevedra, 3 km NW Castro (12 km SE Lalín), 700 m, 2.V.1992
316 Prov. Orense, Alto del Couso (22 km E Orense), 750 m, 2.V.1992
317 Prov. Orense, 2.5 km NW Alto del Rodicio (ca. 32 km E Orense), 1050 m, 2.V.1992
318 Prov. Orense, 2 km SW Covas (NE O Barco), 600 m, 3.V.1992
319 Prov. León, hill S Ponferrada, 500 m, 3.V.1992
320 Prov. León, btw. Molinaseca & Riego de Ambros (E Ponferrada), 750-850 m, 4.V.1992
321 Prov. León, Montes de León, btw. Aceto & Monjarín, 1300 m, 4.V.1992
322 Prov. León, Montes de León, btw. Foncebadon & Rabanal del Camino, 1350 m, 4.V.1992
323 Prov. León, 7 km E Astorga, 850 m, 4.V.1992
325 Prov. Burgos, btw. Iblas de J. & Arlanzón (E Burgos), 900 m, 5.V.1992
326 Prov. Burgos, 3 km E Herreros (20 km E Burgos), 1100 m, 5.V.1992
327 Prov. Burgos, Sa. de la Demanda, Mt. Mencilla, 1425 m, 5.V.1992
328 Prov. Burgos, Sa. de la Demanda, Cóllado el Manquillo, 1400 m, 5.V.1992
329 Prov. Burgos/Soria, Sa. de la Demanda, Pto. del Hierro (8 km SE Quintanar de la Sa.), 1200-1375 m, 6.V.1992
330 Prov. Soria, near Lubia (15 km S Soria), 1050-1100 m, 6.V.1992
331 Prov. Soria, 4 km S Adradas (23 km N Medinaceli), 1100 m, 6.V.1992
332 Prov. Guadalajara, btw. Alcolea del Pinar & Luzaga (S Medinaceli), 1200 m, 6.V.1992
333 Prov. Guadalajara, btw. Huertahernando & Olmeda de Cobeta (ca 30 km W Molina d. A.), 1200 m, 7.V.1992
334 Prov. Guadalajara, 6 km E Cobeta (ca. 20 km W Molina de Aragon), 1225 m, 7.V.1992
335 Prov. Guadalajara, btw. Embid & Eta. de Sto. Domingo (SW Daroca), 1125 m, 7.V.1992
365 Prov. Castellón, 2 km E Pto. de Torre Miró (11 km N Morella), 1200 m, 17.IV.1995
368 Prov. Teruel, Pto. de Cuarto Pelado (89 km NE Teruel), 1600 m, 18.IV.1995
369 Prov. Teruel, 2 km SE Pto. de Cuarto Pelado (89 km NE Teruel), ca. 1600 m, 18.IV.1995
370 Prov. Teruel, Pto. de Villaroya (ca. 70 km NE Teruel), 1700 m, 18.IV.1995
372 Prov. Teruel, Pto. de Cabigordo (27 km NE Teruel), 1550 m, 18.IV.1995
373 Prov. Teruel, Mt. Castelfrio (32 km NE Teruel), 1600 m, 19.IV.1995
374 Prov. Teruel, 3 km SW Aliaga (ca. 70 km NE Teruel), ca. 1200 m, 19.IV.1995
375 Prov. Teruel, Pto. de Majalinos (90 km NE Teruel), 1450 m, 19.IV.1995
377 Prov. Teruel, Pto. de Fonfría (ca. 30 km SE Daroca), 1470 m, 19.IV.1995
378 Prov. Teruel, btw. Calamocha & Tornos (S Daroca), 1100 m, 20.IV.1995
379 Prov. Zaragoza, Sa. de Sta. Cruz (W Daroca), Pto. de Used, 1200 m, 20.IV.1995
379a Prov. Zaragoza, Sa. de Sta. Cruz (W Daroca), Pto. de Used, 1200 m, 3.VI.1997
399 Prov. Navarra, below Pico Gorramakil (ESE Irun), 1000 m, 4.V.1996

400 Prov. Navarra, 2 km W Pto. de Artesiaga (ca. 30 km NNE Pamplona), 1140 m, 5.V.1996
404 Prov. Navarra, Sa. de Aralar (S San Sebastian), Sant. de San Miguel de Aralar, 1200 m, 5.V.1996
406 Prov. Álava, Pto. de Opacua (5 km SE Salvatierra), 1020 m, 6.V.1996
407 Prov. Guipúzcoa, btw. Arantzazu & Mt. Aitzgorri (SE Oñati), 1150 m, 6.V.1996
408 Prov. Guipúzcoa, btw. Oñati & Legazpia, 600 m, 7.V.1996
409 Prov. Guipúzcoa, btw. Vidania & Regil (NW Tolosa), 750 m, 7.V.1996
410 Prov. Vizcaya, E Pto. Urquiola, 650 m, 7.V.1996
411 Prov. Vizcaya, Mt. Sollube, 600 m, 7.V.1996
412 Prov. Álava, 3 km N Pto. de Orduña (S Amurrio), 600 m, 8.V.1996
413 Prov. Álava/Burgos, Pto. de Orduña (S Amurrio), 900 m, 8.V.1996
414 Prov. Burgos, near Villaventín (ca. 20 km NE Medina de Pomar), 700 m, 8.V.1996
415 Prov. Cantabria, 3 km S Pto. del Asón (ca. 50 km SE Santander), 850 m, 8.V.1996
417 Prov. Burgos, near Espinos de los Montreros (ca. 70 km WSW Bilboa), 775 m, 9.V.1996
418 Prov. Burgos, 2 km SE Sancillo (ca. 75 km S Santander), 940 m, 9.V.1996
422 Prov. Burgos, 1 km W Cornudilla (18 km NW Briviesca), 670 m, 9.V.1996
423 Prov. Burgos, 3.5 km W Poza de la Sal (23 km NW Briviesca), 950 m, 9.V.1996
424 Prov. Burgos, btw. Masa & La Nuez de Arriba (ca. 34 km N Burgos), 1050 m, 9.V.1996
425 Prov. Burgos, 2 km NE Urbel del Castillo (40 km SE Aguilar d. C.), 950 m, 10.V.1996
426 Prov. Burgos, btw. La Riba d.V. & Humada (ca. 20 km SE Aguilar d. C.), 1000 m, 10.V.1996
427 Prov. Burgos, 2 km W Rebolledo de Traspeña (SE Aguilar d. C.), 1000 m, 10.V.1996
428 Prov. Palencia, 12 km NW Villela (15 km S Aguilar d. C.), 950 m, 10.V.1996
429 Prov. Cantabria, Pto. Pozazal (12 km S Reinosa), 950 m, 10.V.1996
430 Prov. Cantabria, Monumento (7 km NW Pto. de Palombera, NW Reinosa), 800 m, 11.V.1996
431 Prov. Palencia, near San Cebrián de Buena Madre (20 km SE Fromista), 850 m, 11.V.1996
432 Prov. Palencia, btw. Dueñas & Sta. Cecilia del Acor (SW Palencia), 850 m, 11.V.1996
433 Prov. Valladolid, 6 km NE Urueña (ca. 44 km NNW Valladolid), 850 m, 12.V.1996
437 Prov. Segovía, 1 km W Sepúlveda, 1000 m, 12.V.1996
439 Prov. Segovía, btw. Navares d. l. C. & Aldeanueva d.l.S. (S Aranda d.D.), 1150 m, 13.V.1996
440 Prov. Burgos, 3 km NE Oquillas (ca. 20 km N Aranda d.D.), 950 m, 13.V.1996
441 Prov. Burgos, 3.5 km S Tejada (W Sto. Domingo d. S.), 1075 m, 13.V.1996
442 Prov. Burgos, Pico de la Sierra (W Sto. Domingo d. S.), 1300 m, 13.V.1996
443 Prov. Burgos, btw. Carazo & Hacinas (E Sto. Domingo d. S.), 1050 m, 14.V.1996
444 Prov. Soria, 2 km N Pto. del Madero (btw. Soria & Tarazona), 1220 m, 14.V.1996
445 Prov. Soria, Sa. de Madera, Mt. Vaniegras (btw. Soria & Tarazona), 1400 m, 14.V.1996
460 Prov. Teruel, Sa. de Javalambre, near Torrijas, 1400-1500 m, 1.VI.1997
461 Prov. Teruel, Sa. de Javalambre, SE slope of Mt. Javalambre, 1900 m, 1.VI.1997
464 Prov. Teruel, Montes Universales, below (S) Mt. Carbonera (SE Albarracín), 1300 m, 1.VI.1997
465 Prov. Teruel, Montes Universales, Pto. de Valdecuenca, 1400-1450 m, 2.VI.1997
466 Prov. Teruel, Montes Universales, btw. Calomarde & Frías de Albarracín, 1550 m, 2.VI.1997
467 Prov. Teruel, Montes Universales, El Portillo (SW Guadalaviar), 1700 m, 2.VI.1997
468 Prov. Teruel, Montes Universales, btw. El Portillo & Guadalaviar, 1500 m, 2.VI.1997
469 Prov. Teruel, Montes Universales, 2 km E Orihuela del Tremedal, 1400 m, 2.VI.1997
470 Prov. Teruel, Montes Universales, Pto. de Bronchales (NE Bronchales), 1500 m, 2.VI.1997
471 Prov. Teruel, Montes Universales, 2 km SW Tramacastilla, 1500 m, 2.VI.1997

**Portugal (Po)**

1 Distr. de Beja, Alentejo, 10 km SE Serpa, 100 m, 17.IV.1991
2 Distr. de Beja, Serra do Caldeirão, Moimentos, ca. 500 m, 17.IV.1991
3 Distr. de Beja/Faro, Serra de Monchique, 5 km S Nave Redonda, 300 m, 17.IV.1991
4 Distr. de Faro, Serra de Monchique, Mt. Fóia, 800 m, 18.IV.1991
5 Distr. de Beja, 3 km N Santa Clara-a-Velha (Rio Mira), 100 m, 18.IV.1991
6 Distr. de Setubal, Serra de Grândola, ca. 13 km S Grândola, ca. 200 m, 18.IV.1991
7 Distr. de Setubal, Palma (16 km NW Alcácer do Sal), 50 m, 19.IV.1991
8 Distr. de Lisboa, Serra de Sintra (W Lisboa), near Malveira de Cima, 200 m, 19.IV.1991
9 Distr. de Lisboa, Cheleiros (10 km S Mafra), 50 m, 19.IV.1991
10 Distr. de Lisboa, Serra do Montejunto, 2 km WSW Quartel, 500 m, 19./20.IV.1991
11 Distr. de Leiria, Serra dos Candeeiros, Bezerra (near Serro Ventoso), 400 m, 20.IV.1991
12 Distr. de Santarém, 2 km NW Carregueiros (near Tomar), 150 m, 20.IV.1991
13 Distr. de Coimbra/Leiria, Serra da Lousã, btw. Espinhal & Campelo, 800 m, 21.IV.1991
14 Distr. de Leiria, Serra da Lousã, 10 km N Castanheira de Pêra, 800 m, 21.IV.1991

15 Distr. de Coimbra, 3 km N Mouronho (btw. Coimbra & Guarda), 300 m, 21.IV.1991
16 Distr. de Guarda, Serra da Estrela, Sabugueiro (10 km ESE Seia), 1000 m, 22.IV.1991
17 Distr. de Guarda, Serra da Estrela, 10 km S Sabugueiro (10 km ESE Seia), 1500 m, 22.IV.1991
18 Distr. de Castelo Branco, Serra da Estrela, Penhas da Saúde (10 km NW Covilhã), 1500 m, 22.IV.1991
22 Distr. de Bragança, Serra de Mogadouro, 1 km E Santiago (E Mogadouro), 750 m, 27.IV.1992
23 Distr. de Bragança, Serra de Bornes, Mt. Ladaino, 1050 m, 27.IV.1992
24 Distr. de Bragança, Serra de Nogueira, N slope of Mt. Nogueira, 1000-1300 m, 27./28.IV.1992
26 Distr. de Vila Real, btw. Argemil & Algeriz (ca. 35 km NE Vila Pouca d. A.), 700 m, 28.IV.1992
27 Distr. de Vila Real, Serra da Padrela, Mt. Padrela (15 km NE Vila Pouca d. A.), 1100-1147 m, 28.IV.1992
28 Distr. de Vila Real, Serra do Marão (SW Vila Real), 2 km SE Soutelo, 700 m, 29.IV.1992
30 Distr. de Vila Real, 2 km S Alto de Velão (ca. 20 km W Vila Real), 800 m, 29.IV.1992
33 Distr. de Vila Real, 7 km W Boticas (WSW Chaves), 1000 m, 29.IV.1992
34 Distr. de Vila Real, btw. Gralhos & Montalegre, WNW Chaves, ca. 1000 m, 29./30.IV.1992
35 Distr. de Vila Real, Serra do Larouco, btw. Pardornelos & Sendim, 1150 m, 30.IV.1992
36 Distr. de Braga, Serra do Gerês, Portela de Leonte, 850 m, 30.IV.1992
37 Distr. de Viana de Castelo, Touvedo (4 km E Ponte da Barca), 150 m, 30.IV.1992
38 Distr. de Viana de Castelo, 4 km W Bico (4 km SE Paredes de Coura), 450 m, 1.V.1996

**France (F)**

43 Dept. Aude, Montagne de Tauch (near Tuchan), Tour de Géographes, 870-900 m, 8.IV.1995
43a Dept. Aude, Montagne de Tauch (near Tuchan), Tour de Géographes – Pech de Fraysse, 870-900 m, 20.V. 1996
69 Dept. Pyrénées-Atlantiques, Col de Lecharria (ca. 20 km SSW Mauléon-Licharre), 800 m, 4.V.1996
70 Dept. Pyrénées-Atlantiques, Ahusquy (ca. 20 km ESE St.Jean-Pied-de-Port), 1000 m, 4.V.1996
73 Dept. Haute-Garonne, Col de Portet d'Aspet (28 km W St. Girons), 1000 m, 18.V.1996
74 Dept. Ariège, 1 km NW Col de la Core (btw. Seix & Castillon-en-Couserans), 1300 m, 18.V.1996
81 Dept. Aude, Mt. Milobre de Mossac (btw. Soulatgé & Auriac), 850-900 m, 21.V.1996

## Abbreviations

SEM scanning electron microscope
T(5) (5th) abdominal tergite
pron. pronotum
meson. mesonotum
metan. metanotum
L larva(e)

## Characteristics of the *carpetana*-group

**Legs** (Common characteristics of the genera *Phyllodromica* and *Ectobius*)

Front femur at anteroventral edge with 2-3 proximal, 2 distal spines, and tiny bristlelike spinules in between (Type B2); middle and hind femora at the anteroventral edge with 1-3 spines in the middle and 1 distal spine. Pulvilli on the four proximal tarsal segments of all legs; claws asymmetrical, unspecialized; arolia well-developed.

**Wings**

Forewings strongly reduced, never surpassing the second abdominal segment; outer (anterior) border more or less straight, inner (posterior) border strongly convex, wings, therefore, always broadest in the middle or behind. Colouration: Forewings, except at the costal area, scattered with dark spots, at the base fusing to a larger patch.

Male. Forewings variously long and broad, from scarcely longer than the mesonotum to reaching up to the second abdominal segment; broadly to narrowly egg-shaped (obtuse pole posteriorly, at the apex) (Fig. 12M) or reversely egg-shaped (obtuse pole anteriorly, at the base) (Fig. 54M), from medially touching each other to widely separated. Hindwings in species with longer forewings developed as short lobes of the length of the segment, but absent especially in species with shorter forewings.

Female. Forewings reversely egg-shaped or hatchet-shaped, scarcely longer than mesonotum, widely separated. Hindwings absent.

Differences to other groups. Long-winged species: *baetica*-group with similarly coloured forewings, but basal patch missing and wings truncate. Short-winged species: *subaptera*- and *nana*-group with narrower wings having almost parallel borders, broadest near the base (Figs 7I-L); species of the *panteli*-group and the north African *Lobolampra* species may have similar wing size and shape but are missing the typical colouration pattern.

**Male**

**Glandular structures:** Tergites 7 and 8 each with a pair of **glandular pits** near the anterior border of the segments, usually mostly hidden below the overlapping tergites of the preceding segments.

**T7** typically with a pair of bowl-shaped pits (p in Fig. 9F) completely separated by a longitudinal **median ridge** (mr in Fig. 9F). The anterior part of the ridge is often elevated to a noselike structure, the **anterior process** (ap in Fig. 35F). Opposite the anterior process on the surface of the tergite behind the pits there is a bipartite bristle field, the **bristle tuft** (bt in Fig. 9F), continuing on the posterior part of the ridge up to the anterior process. The bristles of the tuft are specialized, being strongly broadened and curved at the tip (Fig. 7F); in *P. sacarraoi* the bristle tuft is missing (Figs 27E,F). Among the species there is much variability in the shape of the pits and associated structures: The anterior process may be weakly set off from the ridge (*P. moralesi, P. septentrionalis, sacarraoi*-subgroup).The ridge can be reduced *(P. carpetana)* or even missing *(P. acarinata)*. The pits in their extent are seldom completely visible in dorsal view, i.e. truly open bowl-shaped; they are often deepened anteriorly or medioanteriorly beneath the anterior borders of the openings to variously extended **pouches**, in the slide preparations appearing as dark areas (Figs 14G,H, 15C); in the *sacarraoi*-subgroup the pouches are deepened further to large, saclike structures (Figs 26D,G). In some cases the pits are reduced to more or less narrow transversal deepenings or furrows *(P. sulcata* [Figs 21D-F], *P. lativittata, P. rhomboidea)*. The bristle tuft is in some of the species (more derived species of the *moralesi*-subgroup) not on the segment surface but as a whole invaginated, on the photographs recognizable by a broad dark lining (Figs 14G, 15C, 18G) representing the steep walls of the invagination. In other cases the bristle tuft and the adjacent surface is moulded to a longitudinal groove (Figs 44G-I, 50G,H, 51D,E) with the median parts of the tuft on the bottom, the borders of the tuft running along the walls or borders of the groove. In this case the bristle tuft is described as being "recessed", for instance, into a mound.

The glandular pits of **T8** occur in two different forms. In the *moralesi*- and *sacarraoi*-subgroup the pits are well-developed, more or less open bowl-shaped (Fig. 9G). The posterior borders of the pits follow a rather high elevation in the center of the segment; the posterior walls, therefore, are usually higher and steeper than the anterior. The pits in T8 are – as in T7 – often deepened, though only to rather shallow pouches, posteriorly or medioposteriorly beneath the posterior borders of the openings (Figs 12H, 15D). The pits are separated by a median ridge; crest of the ridge often membraneous, posteriorly more or less elevated and ending in a knoblike structure bearing short straight bristles, the **bristle knob** (Figs 9G,H). In some species the bristles are mostly lost *(P. javalambrensis* [Figs 19G,H], *P. sulcata)*, in others the knob is reduced, incorporated into the ridge, the site of incorporation still recognizable by the bristles *(P. globososacculata* [Figs 31G,H], *P. porosa)*. In the *barbata*-subgroup the pits are tiny and shallow, in several species obsolete or even completely missing *(P. rhomboidea* [Fig. 41H], *P. acarinata)*; a clear median ridge is not developed; the "pits" are either separated by a very low swelling or elevation (Fig. 43H) or they are united to a common depression *(P. acuminata, P. lativittata* [Fig. 39H], *P. barbata)*.

**Membrane glands**. Apart from the glandular pits on T7 and T8 there is another set of presumably glandular structures: the intersegmental membranes of T4/5 and T5/6 near the lateral borders of the segments show saclike invaginations, internally with alveolate cuticular structure (Figs 8E-H, 21E). Similar structures may also be found in the preceding and following segments, but more weakly expressed. Often two membrane sacs are developed in succession (Figs 8E,G) on each side of the intersegmental region. The size of the sacs varies considerably between species and segments. At the position of the membrane glands the tergites usually show a – depending on the size of the gland – more or less pronounced excavation (Fig. 49E), indicating that part of the tergite region has been transformed to membrane glands.

**Tergites** 9 and 10 in the longitudinal midline elevated to a rooflike structure. Posterior lobe of T10 (behind insertion of cerci) either long (posterior border of T10 narrowly parabolic, Fig. 10F), of

intermediate length (posterior border broadly parabolic or semicircularly rounded, Fig. 22F), or short (posterior border broadly rounded, Fig. 26F). In the descriptions only the shape of the posterior border will be mentioned. In the figures these differences in the shape of T10 are not always obvious since during mounting the terminalia may become dorsoventrally compressed. Left **paraproct** as in all species of *Phyllodromica* and *Ectobius* with a short spiny process.

**Subgenital plate** (Fig. 20M). Posterior lobe (visible, more or less sclerotized part) rounded triangular, slightly asymmetrical, with one (left) unspecialized, short stylus (s); anteriorly with two very long apodemal processes (a) of unequal length.

**Genitalia.** Not much different from the usual Ectobiinae pattern except for a quite specialized hook in some species. **Left phallomere**: with hook and spatular endophallic apodeme (e) (Fig. 20M), both connected by muscles with and lying parallel to the longer left apodeme of the subgenital plate. **Hook** (L3 according to McKittrick, 1964) with a long shaft (sh) bearing at its apical part a sclerotized longitudinal trough measuring ⅔ or less of the length of the shaft (Fig. 8B); shaft apically tapering to a short stalk (st) followed by an angularly bent claw (cl). – *Sacarraoi*-subgroup partly with aberrant hook structures, the most extreme found in *P. sacarraoi* (Figs 28K, 57N): shaft with a spinelike process at the apical end, stalk very long, widely curved, with a shovellike claw. – **Right phallomere** (Fig. 20M): consisting of the cleft sclerite (cs) continuing into a rather weakly developed R3 apodeme. Between the phallomeres with a well-developed helmet sclerite (h).

### Female

**Genitalia.** Not much differing from the usual Ectobiinae pattern. **Dorsal complex** (Fig. 8I): Recently Klass (1997) has reinvestigated the homologies of the sclerites and proposed a new terminology for some of them. Laterodorsal sclerites of basivalvula (bd; McKittricks "anterior arms of first valvifer") slightly converging anteriorly but not fused, broader in the posterior, narrower in the anterior half; accompanying lateroventral sclerites of basivalvula (bv; McKittricks "basivalvula") anteriorly often broadened, forming a laterally or ventrally open trough. **Ventral complex** (Fig. 8K): Laterosternal shelf (l) with a rounded central part including the vestibular sclerite, and with two short posteriorly diverging arms; between the arms the intersternal folds (i). **Subgenital plate** undivided, broadly rounded, posteriorly with a tiny median emargination.

**Ootheca** short, smooth, without longitudinal ridges, rotated 90% prior to deposition as in all Ectobiinae (keel at the right).

### Colouration

**Male:** Mostly dark except for some whitish-transparent areas: margins around the pronotal disk, lateral and posterior margins of meso- and metanotum (Fig. 17A), posterior part of lateral margins and posterior margin of abdominal tergites and sternites (Figs 18B-E); transition zone between whitish posterior margin and the dark anterior part of the tergites, especially in species with broader whitish margins, with dispersed dark spots on a more yellowish ground colour (Figs 10B,C, 42B,C); tergites 9 and 10 in the middle usually with a whitish longitudinal stripe widening towards the the posterior borders; tergites 7 and 8 usually further lightened (Figs 50D,E), sometimes for the most part lightly coloured (Figs 54D,E). Head mostly dark; interocular space posteriorly in all species with a narrow whitish transversal band, anteriorly in the *moralesi*- and *sacarraoi*-subgroup reddish, in the *barbata*-subgroup as dark as the remaining parts of the head. In the following descriptions the larger anterior part of the interocular space will be referred to just as "interocular space". In some species of the first two subgroups the reddish colour may be still more extended: up to the antennae or, in the extreme, all over the face. Antenna dark, at the base yellowish. Legs mostly dark. Lateral borders and distal part of coxa (inclusively part of the adjacent trochanter) whitish: in most species the whitish distal part of the coxa comprises ¼ or less of its length; in *P. bolivariana* and *P. atlantica* about the distal half of the coxa is whitish ("coxa half dark half whitish"); in *P. moralesi, P. septentrionalis,* and *P. fernandesiana* the extent of the whitish zone is variable and may also measure up to a half of the coxa length. Another regularly lightened area is at the base of the tarsus; in lightly coloured species tibia and femur may also be lightened to a various extent. **Female:** Usually lighter coloured and with lightened areas more extended than in male. Dark central areas of meso- and metanotum in some species interrupted by yellowish patches (Fig. 31D). Abdominal tergites in dark specimens/species mostly dark, with narrow

whitish margins (Fig. 16A). In lighter coloured specimens/species posterior part of the dark area broken up into patches or spots on a yellowish ground colour, either only laterally (Fig. 50A) or over the entire breadth of the tergite (Fig. 42A) (in the descriptions called "patchy zone"). Dark areas at five positions of the segment often more extended (Fig. 10A) giving the abdomen – the dark basal part of the respective tergite is usually covered by the lightly pigmented posterior part of the preceding tergite – the appearance of being lightly coloured with five dark longitudinal stripes. Legs as in male, but more often and to a larger extent lightened, sometimes completely yellowish. Cerci usually dark as in male, in lighter pigmented species or specimens some intermediate segments dorsally lightened.

Disk of pronotum either semicircular (Fig. 35A) or with lateral extensions possibly reaching the lateral borders of the pronotum (Fig. 37A). In some species the pronotum disk may occur in two colour variations, either dark or red-orange (Figs 9A,C,D), as is also observed in other Ectobiinae *(P. subaptera, P. marginata).*

### Biology

The species of the *carpetana*-group are mainly found in montane regions. They usually prefer higher altitudes but – especially those inhabitating localities near the western or northern Atlantic coast – can also be found at lower altitudes (*P. moralesi*: 50 m; *P. fernandesiana*: 150 m). They seem to prefer grassy localities but may also occur in other low vegetation and under leaf litter. The imagos appear in the spring; the longer-living females may be found till September. The oothecae presumably need a winter period for the larvae to hatch. The larvae mainly grow during the following vegetation period, winter once more nearly full grown, and moult to imagos in the following spring.

## Phylogenetic considerations

The *carpetana*-group belongs to those Ectobiinae having a helmet sclerite and a small unspecialized stylus. Other members of this category are, among others, the *sylvestris*-group (Bohn 1989), the *panteli*-group (Bohn 1993), and the *brevipennis*-group.

The closest relatives of the group are the *subaptera*-, the *nana*- (group of species not yet described, occurring in and around the Pyrenees), and the *panteli*-group, which all together seem to form a monophyletic category characterized by the possession of membrane glands in the intersegmental areas especially of tergites 4/5 and 5/6 (Fig. 1, Table 1) [apomorphy 2].

The close relationship of *carpetana*-, *nana*-, and *subaptera*-group is based on three synapomorphies: presence of glandular pits on tergites 7 and 8 (Figs 7A-D; in other species only on tergite 7) [8], the shortened sclerotized trough in the shaft of the hook (in other species in full length of the shaft, Figs 8A-D) [9], and the modified bristles of the T7 glandular pit [4]. The modification mainly concerns the upper part of the bristles being strongly broadened and curled, with an irregular tip (Figs 7F-H). The plesiomorphic structure is undoubtedly a bristle with a long straight shaft and a curved apical part with a conical tip which is found in the T7 glandular pits of many groups of the Ectobiinae (*sylvestris*- [Fig. 7E], *pallidus*-, *vittiventris*-, *brevipennis*-group).

The closer relationship of the *carpetana*- and *subaptera*-group can be inferred from two common features: the more pronounced specialization of the bristles (Figs 7F,G) [5] as compared to the *nana*-group (Fig. 7H), and the concentration of the bristles at the posterior border of the glandular pit (Figs 7A, 9E) [6]. The more or less equal distribution of bristles over the bottom of the pit as found in the *nana*-group (Fig. 7C) is undoubtedly the plesiomorphic state of this character.

The elucidation of the phylogenetic position of the *panteli*-group is impeded by the strong specializations found in the hook and the T7 glandular pit which do not allow a comparison with the other groups. But the relatively long sclerotized trough in the shaft of the hook would argue for a position basal to the three other groups.

The cladogram shown in Fig. 1 requires the assumption of a repeatedly independent reduction of wings. Since several species of the *carpetana*-group still have rudimentary hindwings and relatively long forewings, the disappearance of the hindwings and reduction of the forewings to squamiform structures not surpassing the mesonotum [1] must have occurred in all groups independently, twice even within the *carpetana*-group (not indicated in the cladogram). The extreme reduction found in the *nana*- and *subaptera*-group (forewings very narrow, broadest at the base, Figs 7K,L), accordingly, should

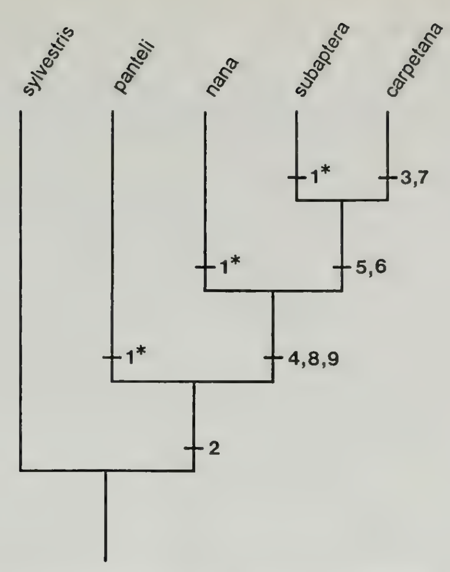



**Fig. 1.** Cladogram showing the assumed relationships between the *carpetana*-group and related groups of the Ectobiinae. The numbers represent apomorphic characters listed in Tab. 1; homoplasies marked with an asterisk. Autapomorphies of the other groups not shown. The *sylvestris*-group only serves here as a representative of the more basal groups; it is not necessarily the sister group of the other four groups.

also have been independent events (not indicated in the cladogram). The independent evolution of similarly reduced wings does not seem to be extremely unlikely. Wing reduction obviously was a very frequent event in cockroach evolution. Similar reduction stages can be found at virtually all taxonomic levels.

A tentative cladogram of the species of the *carpetana*-group is shown in Fig. 2 (Table 2). It shows a basal dichotomy separating the species having reddish interocular space [5] and a pair of well-developed T8 glandular pits separated by a median ridge with a bristle knob [21] (*moralesi*- and

**Tab. 1.** List of characters used for the reconstruction of the cladogram of Fig. 1.

| Characters | No. | Apomorphic state | Plesiomorphic state |
|---|---|---|---|
| **Wings:** | | | |
| forewings | 1[1)] | widely separated, scarcely longer than mesonotum | touching each other, at least reaching to 2. abdominal segment |
| hindwings | | absent | present |
| **Tergite structures:** | | | |
| membrane glands | 2 | present | absent |
| T7 glandular pit: | | | |
| median ridge | 3 | present | absent |
| shape of bristles | 4 | modified | not modified |
| | 5 | – strongly modified | moderately modified |
| distribution of bristles | 6 | bristles concentrated at posterior border of pit | distributed over the entire bottom of the pit |
| | 7 | – bristles united to a tuft | two more or less separated portions of bristles |
| T8 glandular pit | 8 | present | absent |
| **Genitalia, hook of left phallomere:** | | | |
| sclerotized trough of shaft | 9 | in the apical ⅔ | in full length of the shaft |

1 The reduction of fore- and hindwings is considered here as one character.

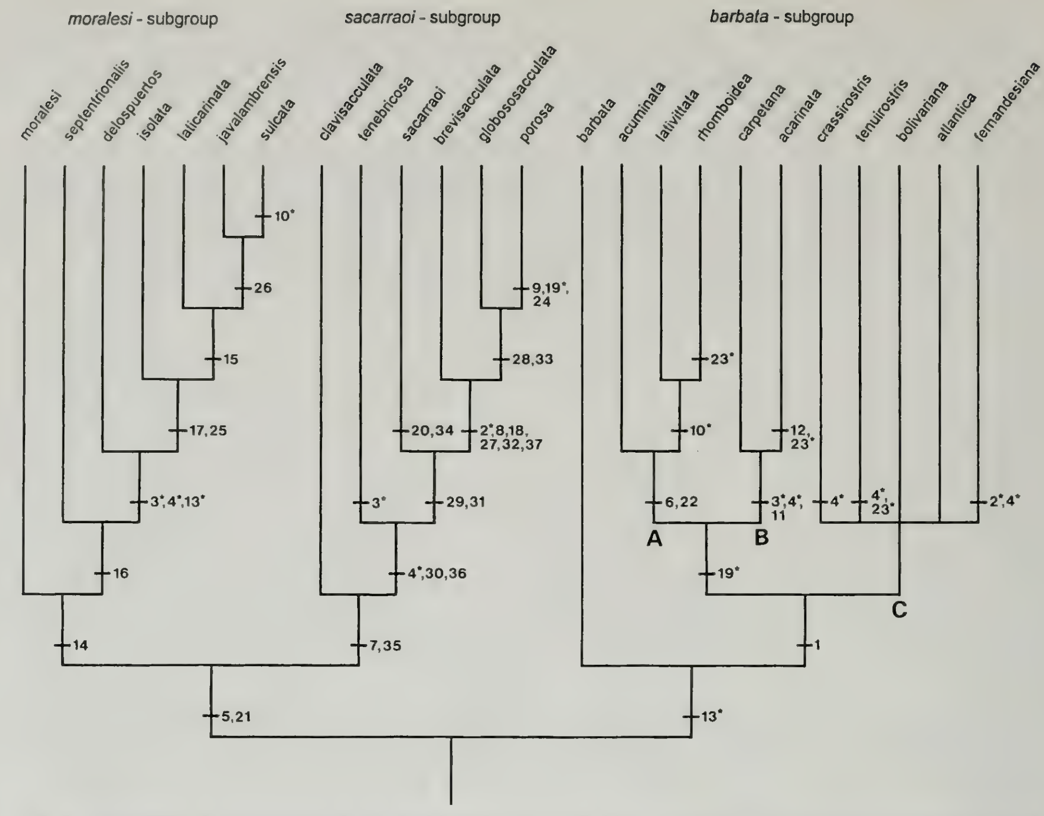



**Fig. 2.** Cladogram of the species of the *carpetana*-group showing the assumed phylogenetic relationships. The three main branches represent subgroups designated as *moralesi-*, *sacarraoi-*, and *barbata*-subgroup. The numbers represent the main apomorphic characters listed in Table 2; homoplasies marked with an asterisk.

**Tab. 2.** List of male characters used for the reconstruction of the cladogram of the *carpentana*-group (Fig. 2); apomorphies 5-8 are also valid for females.

| Characters | No. | Apomorphic state[1] | Plesiomorphic state |
|---|---|---|---|
| **Wings:** | | | |
| forewings[2] | | widely separated | touching each other |
| | 1 | – long, surpassing the metanotum | |
| | 2 | – of intermediate length | |
| | 3 | – short, not longer than mesonotum | |
| hindwings | 4 | not or not clearly set off | clearly set off |
| **Colouration:** | | | |
| head, interocular space | 5 | reddish | dark |
| pronotum disk | 6 | regularly with lateral extensions | not regularly with extensions[3] |
| **T7 glandular structures:** | | | |
| pits | 7 | with deep pouches | open bowl-shaped |
| | 8 | – pouches opening into a lowered atrium | openings on segment surface |

1 The further modification of a previous apomorphic state is indicated by a dash (apomorphies 7-9 etc.).
2 Apomorphies 1-3 represent the three most frequently observed reduction forms of the forewings; they do not necessarily represent successive reduction steps.
3 In the apomorphic state the extensions are present in all individuals (males and females), in the plesiomorphic state extensions may be present, but in the females only exceptionally (see remarks under *P. acuminata*).

**Tab. 2.** (continued).

| Characters | No. | Apomorphic state[1] | Plesiomorphic state |
|---|---|---|---|
| | 9 | – pouches reduced to flat baglike structures | not reduced |
| | 10 | reduced to transversal furrows | well-developed |
| median ridge | 11 | strongly lowered behind anterior process[4] | not lowered |
| | 12 | – almost completely missing[5] | |
| anterior process | 13 | very distinct | weakly set off |
| | 14 | with transversal folds/furrows | without |
| | 15 | – transversal furrows deepened to slits | no slits |
| bristle tuft | 16 | invaginated | not invaginated[6] |
| | 17 | longitudinal ridge within the bristle tuft | without |
| | 18 | complete bristle tuft on a broad bulge | not so |
| | 19 | forming a long band with parallel borders | not so |
| | 20 | absent | present |
| **T8 glandular structures:** | | | |
| pits | 21 | well-developed, with median ridge | shallow, no median ridge |
| | 22 | forming a kidney shaped transversal trough | not so |
| | 23 | absent | present |
| | 24 | margins with huge glandular pores | with small or no pores |
| median ridge | 25 | membranous crest regularly folded | not regularly folded |
| | 26 | – crest forming a torus with a posterior extension | not forming a torus |
| bristle knob | 27 | mainly sclerotized | membranous |
| | 28 | lowered, almost incorporated into ridge | strongly elevated |
| surface behind pits | 29 | with median longitudinal elevation and adjacent lateral depressions | without elevations and depressions |
| **Genitalia, hook of left phallomere:** | | | |
| shaft | 30 | sclerotized trough much shorter than ½ of its length | longer |
| | 31 | spine or dent at apical end | without spine or dent |
| | 32 | curved | straight |
| stalk | 33 | long, claw not reaching to spine (dent) | short, claw reaching or surpassing the spine (dent) |
| hook | 34 | highly specialized[7] | not specialized in this way |
| **Other structures:** | | | |
| supraanal plate (T10) | 35 | short, posteriorly broadly rounded | long, less broadly rounded |
| subgenital plate | 36 | apical sclerotization slightly reduced[8] | not reduced |
| | 37 | – strongly reduced | |

4 In *P. bolivariana* there is – due to the ascending anterior process – also a deep step between anterior process and the median ridge behind, but the ridge itself is not lowered.

5 Because of the absence of the median ridge pits of both sides combine to a common transversal furrow similar to apomorphy 13, but differing by the stronger deepness of the furrow and the presence of a prominent anterior process partly covering the furrow.

6 see discussion on p. 14, 3rd paragraph.

7 see discussion on p. 20, 4th paragraph.

8 see discussion on p. 20, 4th paragraph.

*sacarraoi*-subgroup) from those having a dark interocular space and, on T8, only rather obsolete depressions (*barbata*-subgroup). Comparison with the outgroups indicates that the latter more likely represents the plesiomorphic state: The species of the *nana*-group have very similar T8 glandular pits (Fig. 7D); in the *subaptera*-group these structures vary considerably, from well-developed to nearly obsolete; but the median ridge – typical of the left branch – is never found. Other features of the presumable stem species of the *carpetana*-group are: relatively long, rounded wings reaching at least up to the posterior border of T2 and a pair of T7 glandular pits completely separated by a ridge [3 in Table 1], posteriorly bearing the tuft [7 in Table 1], anteriorly with a little pronounced noselike

projection, the anterior process. The anterior process becomes more pronounced in the more derived species of the *moralesi*- and *barbata*-subgroup [13].

The three main branches of the dendrogram represent three well-defined subgroups. A common feature of the species of the ***moralesi*-subgroup** is the formation of transversal cuticular folds/furrows on and above the anterior process of T7 glandular pit [14]. In the more derived species *(P. laticarinata, P. javalambrensis)* the furrows are deepened to pronounced slits [15]. The close relationship of the five terminal species is well-founded by a series of apomorphic characters: pronounced anterior process on the median ridge of the T7 glandular pit [13]; invagination of the tuft area already indicated in *P. septentrionalis* [16]; very short and narrow forewings [3], no hindwings [4]. Important steps in the evolution of this group are: Development of a longitudinal ridge within the bristle tuft [17]; the membraneous crest of the ridge separating the glandular pits of T8 becoming regularly folded [25] and finally transforming to a round swelling (torus) [26]. In *P. sulcata* the glandular pits of T7 are reduced to narrow transversal furrows [10].

Considering the great similarity between *P. isolata* and *P. javalambrensis* in the regular folding of the membranous crest of the median ridge of T8 (Figs 15H, 19H) one might argue for a closer relationship of the two species. But the great similarities of the T7 glandular pits between *P. delospuertos* and *P. isolata* on the one hand, and between *P. laticarinata* and *P. javalambrensis* on the other hand (not contained in Table 2) and the common possession of deep slits on the anterior process [15] in *P. laticarinata* and *P. javalambrensis* but not in *P. isolata* clearly argue for the relationship shown in Fig. 2. The absence of transversal slits in *P. sulcata* (not specified in Table 2) has to be seen in connection with the reduction of the complete complex. The less regular arrangement of the folds in *P. laticarinata* (Fig. 17I) then would be due to a secondary reduction possibly in connection with the broadening of the ridge. The proposed phylogeny is additionally supported by the steady shortening of the anterior process at least from *P. isolata* to *P. javalambrensis* (not specified in Table 2).

The species of the ***sacarraoi*-subgroup** are characterized by deep glandular pouches on T7 [7] which, however, in one of the terminal species *(P. porosa)* are secondarily reduced to small and flat baglike structures [9]. Another characteristic is the rather short and posteriorly broadly rounded (in *P. sacarraoi* transversely cut) supraanal plate (T10) [35]. The hook, which in the species of the other subgroups is almost invariable, shows various modifications useful for the reconstruction of the phylogeny: shortening of the sclerotized trough of the shaft to less than half of its length [30], development of a dental process at the apical end of the shaft [31], curvature of the shaft [32], elongation of the stalk of the claw [33]. An extremely aberrant hook is found in *P. sacarraoi* [34] (see below). Another structure variable within the subgroup is the length of the apical sclerotization of the subgenital plate (Table 3). In the sequence of the assumed phylogeny the sclerotization is steadily reduced. For the construction of the cladogram only the two steepest steps in the reduction series are considered as apomorphies: 62 % → 56 % [36] and 53 % → 48 % [37]. Other apomorphic characters of the more derived species are sclerotization of the bristle knob [27], and finally its diminishment and disappearance [28]. Obviously, the hindwings were reduced very early in the evolution of the group [4]; forewings at least twice independently reduced [2,3].

The position of *P. sacarraoi* as indicated in the cladogram seems to be contradictory to some of its characters. The apparent discrepancies are due to its highly aberrant hook. *P. sacarraoi* should, for example, have apomorphy [30], but the sclerotized trough of the hook measures about half of its length (Fig. 57N). However, the strong narrowing of the shaft towards the base suggests a diminuation of the

**Tab. 3.** Length of apical sclerotization of the male subgenital plate in the *sacarraoi*-subgroup (compared with *P. moralesi*), in % of total length; points of measurements see Fig. 24L.

| | N | mean [%] ± SD | range [%] |
|---|---|---|---|
| *P. clavisacculata* | 8 | 62 ± 1.4 | 61-65 |
| *P. tenebricosa* | 20 | 56 ± 3.1 | 51-61 |
| *P. sacarraoi* | 16 | 53 ± 2.6 | 47-56 |
| *P. brevisacculata* | 10 | 48 ± 2.5 | 44-51 |
| *P. globososacculata* | 16 | 46 ± 3 | 42-51 |
| *P. porosa* | 7 | 44 ± 2.2 | 40-47 |
| *P. moralesi* | 10 | 61 ± 2.6 | 60-65 |

basal parts; the relative size of claw and trough is not different from that of *P. tenebricosa* (Fig. 26I) having apomorphy [30]. Whether the angle in the shaft is correlated with apomorphy [32, curvature of the shaft] remains unclear. Apomorphy [33, elongation of the stalk] seems also to be realized in *P. sacarraoi* and would suggest a possible positional exchange with *P. brevisacculata*. Similarities in the shape of the median ridge with *P. globososacculata* would also point in this direction. But a series of synapomorphies [8, 18, 27, 37] shared by *P. brevisacculata* and *P. globososacculata*, and partly also by *P. porosa*, in my eyes argues for the relationships as shown in Fig. 2. The elongation of the stalk in *P. sacarraoi* is thus considered as an independent development in connection with the strong transformation of the hook [34].

The close relationship of *P. porosa* with *P. globososacculata* is – apart from synapomorphies [28, 33] – further supported by other features not contained in Table 2. The shape of the pits in T7 (flat pouches) and T8 (very low pits) in *P. porosa* suggest that a dorsal-ventral flattening of the structures of the tergites had occurred. The shape of the bristle tuft in *P. porosa* (longitudinal band) is quite unusual for the subgroup, but can easily be deduced from a shape found in *P. globososacculata* when it is assumed that the longitudinal bulge bearing the bristle tuft is strongly reduced in height (compare Figs 32H and 34G). The assumed flattening could also have caused the disappearance of the atrium in *P. porosa* (not specified in Table 2). The two species also share the elevations between bristle tuft (or bulge with bristle tuft) and the lateral borders of the pouch openings; however, this structure is not found in the southern population of *P. globososacculata* (see there under remarks).

The species of the ***barbata*-subgroup** have, as a plesiomorphic feature, mostly obsolete glandular pits on T8. While *P. barbata* has – a presumably plesiomorphic feature – long, broadly rounded forewings nearly touching each other, in the other species distinctly shaped forewings have been developed: The wings are long, passing beyond the metanotum, but narrow and well separated, broadest near the middle [1]. Wings have been further reduced: only hindwings in *P. crassirostris* and *P. tenuirostris* [4], both pairs of wings in *P. carpetana* and *P. acarinata* [3,4], and, to a lesser degree, in *P. fernandesiana* [2,4]. The glandular structure of T7 originally (*P. barbata*, as presumably also in the stem species of the whole *carpetana*-group) consists of a pair of bowl-shaped pits separated by a median ridge. This shape is maintained with only little variation in all species of branch C; in the other branches the median ridge [11,12] (branch B) or the pits including the ridge may be reduced [10] (branch A). Reduction of the pits of T8 obviously has occurred several times independently *(P. rhomboidea, P. acarinata, P. tenuirostris)* [23].

There is little doubt about the close relationship of the species within **branch A** or **B**, but the proposed mutual relationships are less well-founded. The common feature in the T7 glandular pits [19] is also found in a similar expression in *P. porosa* (*sacarraoi*-subgroup), a fact which may relativize the value of this synapomorphy though I am quite certain that both structures are homoplasies (see p. 21, 2nd paragraph). The geographical distribution of the species of both branches – they are mainly restricted to the central sierras of the Iberian peninsula (Figs 5,6) – also supports the proposed relationships.

Macroscopically, *P. carpetana* and *P. acarinata* (branch B) are very similar to the species of the upper branch of the *moralesi*-subgroup *(P. delospuertos* through *P. sulcata)*. Similar colouration and wing structures [3,4] make them nearly indistinguishable in the field (geographically they are separated). They also share a distinct anterior process [13] neither found in the two basal species of the *moralesi*-subgroup nor in the *sacarraoi*-subgroup. However, the species of the two groups show strong differences in the glandular structures of T8 [21] and in the colouration of the interocular space [5]; moreover, the transversal furrows/folds on the anterior process [14] and the invagination of the bristle tuft [16] are not found in the species of branch B. The assumption of an independent reduction of the wings (s. above) and independent development of a more pronounced anterior process seems to be the more likely hypothesis.

There is another similarity with species of the *moralesi*-subgroup: *P. lativittata* and *P. rhomboidea* (branch A) have similarly reduced T7 glandular pits as *P. sulcata* [10]. But the strong differences between the two groups just mentioned [5,21] and, in addition, the differences in the shape of the pronotum disc [6] and in the wing structures [1] make a close relationship quite unlikely. Independent reduction of the glandular pits of T7 in both groups is, in my eyes, the more parsimonious assumption.

The phylogeny of the species of **branch C** cannot be resolved satisfactorily. The species in various combinations share certain features which, however, in no case can be convincingly used as synapomorphies for the establishment of sister-group relationships: 1. *P. crassirostris* and *P. tenuirostris* have

similarly reduced hindwings [4], a characteristic they also share with *P. fernandesiana* which, in addition, has shortened forewings [2]; but wing reductions are susceptible to homoplasies. 2. There are similarities between *P. tenuirostris* and *P. bolivariana* in the shape of T7 (posterior border strongly concave) and the T7 glandular pits (narrow anterior process, relatively steep mound behind openings); but the differences in the shape of the T7 gland within one species *(P. fernandesiana)* are nearly as great as between the species. 3. *P. bolivariana* has in common with *P. atlantica* and *P. fernandesiana* a similarly coloured coxa (half dark half whitish); but this feature is not realized in all individuals of *P. fernandesiana*. 4. Finally *P. atlantica* and *P. fernandesiana* are similar in the light pigmentation of T7 and T8; but *P. barbata*, the most basal species of the subgroup, may have similarly lightened tergites.

## Geographical distribution

The four closely related groups of *Phyllodromica* shown in Fig. 1 seem to have evolved and radiated within the Iberian peninsula: the *carpetana*-group is found only within the peninsula (s. below); the *nana*-group is restricted to its northeastern corner; the *panteli*-group is distributed in the southern part of the peninsula and in northern Morocco – in the latter region only with the more derived species; *subaptera* is the only group with a wider distribution including most Mediterranean countries. But the fact that males of this group are only found within the Iberian peninsula argues for an Iberian origin of the *subaptera*-group, too, with a subsequent spreading of presumably parthenogenetic strain(s) over the Mediterranean region.

For a possible candidate as the sister taxon of the whole complex one must look in the *sylvestris*-group, of which four species inhabit mainly northern Spain: *Ectobius lucidus*, *E. brunneri*, *Phyllodromica pyrenaicus*, and *P. chopardi.* Among these *P. pyrenaicus* seems to be the most likely candidate since it has a similar T7 glandular pit as the species of the *nana*-group and at least slightly shortened wings. But the lack of unique synapomorphic characters does not allow a clear decision at the moment.

The geographical distribution of the species of the *carpetana*-group (Figs 3-6) is in good agreement with the proposed relationships (Fig. 2). Most species have a rather restricted distribution. The obviously low mobility of the species is at least partly due to the inability to fly and the preference for higher altitudes. As a consequence many species are still found near to their presumable sites of origin. Thus, closely related species inhabit, in most cases, neighbouring regions. Under favorable conditions it is even possible to project the cladogram upon the distribution map and follow spreading and branching of the species.

The *sacarraoi*-subgroup, for example, as seen from the geographical distribution (Fig. 4), had its origin in the western part of the Sierra Nevada and spread and radiated from there towards the east and north. *P. globososacculata*, the only species of this subgroup with a wider distribution, presumably originated in the area of the Sierra de Segura and then spread over the most part of northern Spain.

The congruence of phylogeny and geographical distribution is also quite obvious in the *barbata*-subgroup despite considerable overlap between species (Figs 5, 6). The two main branches of this subgroup are geographically separated, the left (branches A and B) being restricted to the central, the right (branch C) to the northern sierras, while *P. barbata*, which is closest to the common stem species, is found in both regions.

The distribution of the basal species of the *moralesi*-subgroup (Fig. 3) supposes an initial spreading from south to north. The radiation of the terminal species finally took place within a rather small area in the east, in the area SW of the Ebro Delta. The great distance of *P. isolata* from its next relatives suggests that it has reached its present habitat passively by over-long-distance-dispersal, maybe by birds.

So far, no species of the *carpetana*-group has been found in the southwestern corner of the peninsula and in the region between the Pyrenees and the Ebro, up to its tributary Arga in the west (Fig. 3) inspite of extensive collectings in both areas. Two smaller distributions gaps in montane regions – in Portugal between the rivers Mondego and Douro and in northern Galicia – are most likely due to collecting gaps. Two species have succeeded in colonizing the French Pyrenees and the Corbières: *P. bolivariana* (Fig. 5), presumably coming from the west, and *P. isolata* (Fig. 3, see preceding paragraph).

A further spreading of the group outside the Iberian peninsula does not seem to have occurred. Among the museum material which I could study there were three specimens of supposedly North

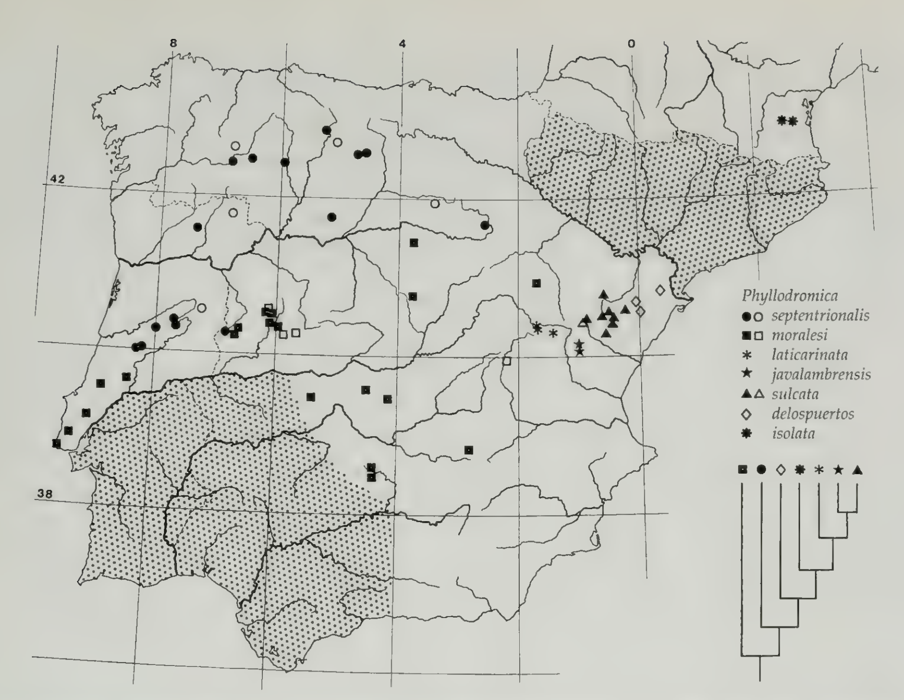



**Fig. 3.** Geographic distribution of the species of the *moralesi*-subgroup. In cases with two symbols for one species, filled symbols: both sexes found, empty symbols: only female(s) found. At the lower right margin: the cladogram for this subgroup. In the stippled areas so far no representatives of the *carpetana*-group had been found.

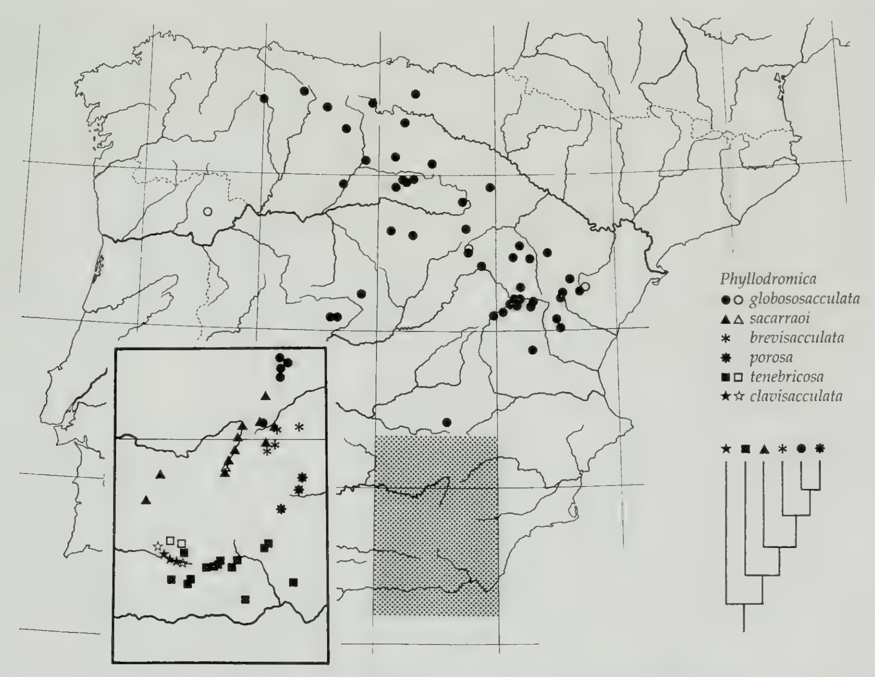



**Fig. 4.** Geographic distribution of the species of the *sacarraoi*-subgroup; stippled area enlarged at the left. Full symbols: both sexes found, empty symbols: only female(s) found. At the lower right margin: the cladogram for this subgroup.

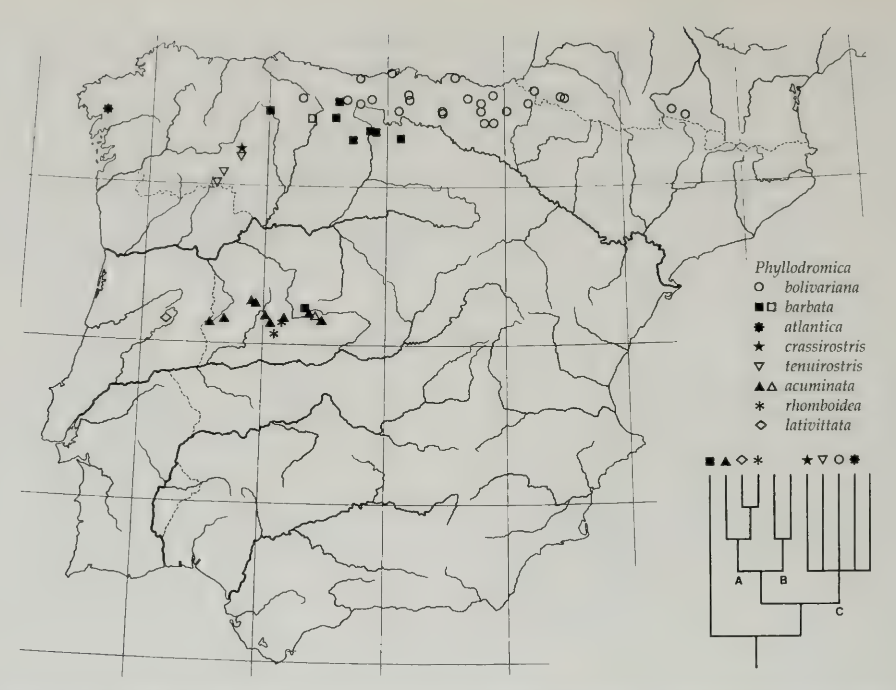



**Fig. 5.** Geographic distribution for part of the species of the *barbata*-subgroup. In cases with two symbols for one species, full symbols: both sexes found, empty symbols: only female(s) found. At the lower right margin: the cladogram for the subgroup with the species treated in this figure.

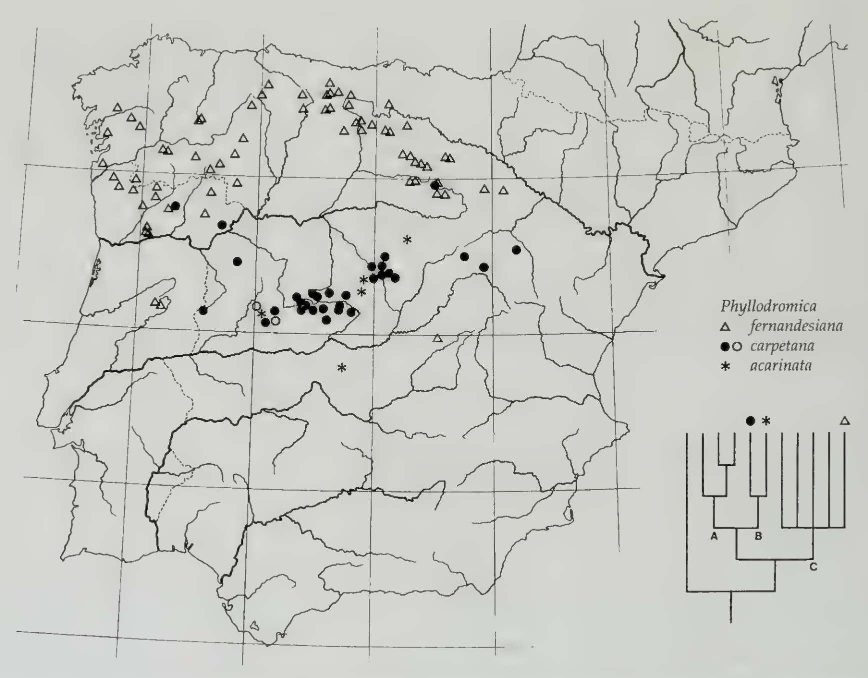



**Fig. 6.** Geographic distribution for part of the species of the *barbata*-subgroup. In cases with two symbols for one species, full symbols: both sexes found, empty symbols: only female(s) found. At the lower right margin: the cladogram for the subgroup with the species treated in this figure.

African origin. The material from the museum in Madrid contained two females labelled with "Azrou? Fez?". Morales Agacino (1948) had already mentioned the two specimens which presumably belong to *P. sacarraoi*. The third specimen, a male of *P. fernandesiana* from the museum in Paris, did not have any locality label. It was hidden among material from Algeria determined as *Hololampra algerica* (Chopard). The doubtful and incomplete labellings of the specimens in connection with the fact that I had repeatedly collected cockroaches in North Africa and never found any representative of the *carpetana*-group there makes a North African origin of the three specimens highly unlikely. The *carpetana*-group is obviously endemic to the Iberian peninsula.

### Key for the determination of the males of the *carpetana*-group

(Due to its variable wing length *P. porosa* appears twice in the key)

1. Forewings considerably longer than mesonotum, reaching or surpassing the posterior border of the metanotum (Fig. 11A); hindwings set off or not ........................................................................ 2.
– Forewings at the most reaching the middle of the metanotum (Fig. 25A); hindwings not set off (Fig. 25B) ........................................................................................................................................ 14.
2. Hindwings clearly set off, incision at least up to the middle of the segment (Fig. 37B) ............... 6.
– Hindwings not set off or only indicated by a shallow emargination at the posterior border of the metanotum (Fig. 27B) .................................................................................................................... 3.
3. Posterior border of T10 (supraanal plate) transversely cut (Fig. 28F); T7 glandular pits with a pair of deep pouches, bristle tuft missing (Fig. 28D); forewings nearly touching each other ................ ............................................................................................................. *P. sacarraoi* Fernandes
– Posterior border of supraanal plate rounded (Fig. 34F); T7 glandular pit with very short or no pouches, bristle tuft present; forewings widely separated ........................................................... 4.
4. Posterior borders of T6 and T7 nearly straight (Figs 34C,D); T7 glandular pits developed as short flat pouches, tuft area extending far beyond opening (Fig. 34G); T8 strongly sculptured, with two well-developed glandular pits (Fig. 34H) ........................................................ *P. porosa*, spec. nov.
– Posterior borders of T6 and T7 concave; T7 glandular pits open bowl-shaped, tuft area ending shortly behind opening (Figs 48G, 50G); T8 scarcely sculptured, pits obsolete (Figs 48E, 50E) ..... ............................................................................................................................................ 5.
5. Posterior borders of T6 and T7 strongly concave (Figs 50C,D), anterior process of T7 gland narrow and long (Figs 50G,H); posterior border of the dark central marking of T7 in the middle transversely cut, laterally with posterior extensions (Fig. 50D) .................................. *P. tenuirostris*, spec. nov.
– Posterior border of T6 and T7 less strongly concave (Figs 48C,D), anterior process of T7 gland broad and short (Figs 48G,H); dark central marking of T7 in the middle with a broad trigonal posterior extension (Fig. 48D) ....................................................................... *P. crassirostris*, spec. nov.
6. Forewings egg-shaped, broadest behind the middle, apex broadly rounded, nearly touching each other or separated (Fig 36L) ............................................................................................................ 11.
– Forewings reversely egg-shaped, usually broadest in or near the middle, apex narrowly rounded, well-separated (Fig. 38O) ............................................................................................................... 7.
7. Disk of pronotum semicircular, without lateral extensions (Fig. 51A); distal ½ of coxa whitish ... ............................................................................................................................................ 10.
– Disk of pronotum posteriorly with lateral extensions possibly reaching the lateral border of the pronotum (Fig. 37A); at most distal ¼ of coxa whitish ........................................................................ 8.
8. Lateral extensions usually not reaching lateral borders of the pronotum (Fig. 41A); surface of T8 more or less smooth, without glandular pits (Fig. 41H) ............................. *P. rhomboidea*, spec. nov.

– Lateral extensions reaching lateral borders of pronotum; surface of T8 strongly sculptured, anteriorly with a narrowly kidney-shaped transversal groove posteriorly followed by a rounded or triangular elevation ........ 9.

9. Lateral extensions very broad (Figs 39A,C); T7 glandular pits reduced to a broad transversal furrow (Figs 39E-G); elevation of T8 broadly rounded (Fig. 40H) ........ *P. lativittata*, spec. nov.

– Lateral extensions less broad (Fig. 37A); T7 glandular pits well-developed (Fig. 37E); elevation of T8 triangular (Figs 38H-K) ........ *P. acuminata*, spec. nov.

10. Forewings very narrow (length/breadth 1.72-1.84), T8 anteriorly dark (Fig. 52E), behind pits of T7 with a relatively steep mound ........ *P. bolivariana*, spec. nov.

– Forewings broader (length/breadth 1.55-1.67), T8 anteriorly lightly coloured (Figs 54E,H), behind pits of T7 with a flat mound ........ *P. atlantica*, spec. nov.

11. T7 glandular pits with deep pouches, openings occupying most of the tergite length (Fig. 24D); posterior border of T6 strongly concave (Fig. 24C) ........ *P. clavisacculata*, spec. nov.

– T7 glandular pits without deep pouches, openings much smaller; posterior border of T6 less strongly concave ........ 12.

12. Posterior border of T10 broadly rounded (Fig. 36F), T8 with very shallow glandular pits (Fig. 35G), interocular space dark ........ *P. barbata*, spec. nov.

– Posterior border of T10 narrowly parabolic (Fig. 10F), T8 with a pair of deep pits, separated by a high ridge (Fig. 9G), interocular space reddish ........ 13.

13. T7 glandular pits in outline semicircular, posterior borders quite distinct (Figs 9F,G); knob of T8 glandular pits at the level of the remaining crest ........ *P. moralesi* Fernandes

– T7 glandular pits without definable posterior border (Fig. 11E); knob of T8 glandular pits much higher than remaining crest ........ *P. septentrionalis*, spec. nov.

14. Forewings relatively broad, distance between wings not larger than wing breadth (Figs 29A, 33C) ........ 15.

– Forewings narrow, distance between wings considerably larger than wing breadth (Figs 25A, 13A, 43A) ........ 18.

15. Distal ½ of coxae whitish (in most cases), T8 glandular pits obsolete, interocular space dark ........ *P. fernandesiana*, spec. nov.

– At most distal ¼ of coxae whitish, T8 glandular pits well-developed, interocular space reddish ........ 16.

16. T7: posterior border nearly straight, glandular pits forming short pouches not surpassing the anterior border of the segment (Fig. 34D) ........ *P. porosa*, spec. nov.

– T7: posterior border strongly concave, glandular pits forming large pouches considerably surpassing the anterior border of the segment ........ 17.

17. Pouches not or only slightly widening beyond opening, shorter than length of tergite (Figs 30D,H) ........ *P. brevisacculata*, spec. nov.

– Pouches strongly widening beyond opening, globular, at least of the length of the segment (Fig. 32D) ........ *P. globososacculata*, spec. nov.

18. T8 glandular pits well-developed, interocular space reddish ........ 20.

– T8 glandular pits obsolete or missing, interocular space dark ........ 19.

19. Anterior process of T7 glandular pit sinusoid, gradually tapering towards the rounded tip (Figs 46D,H,G); T8 without pits (Fig. 46E) ........ *P. acarinata*, spec. nov.

– Anterior process dentiform, with almost parallel borders (Figs 44D,G-I); T8 with shallow pits, at least anterior borders clearly visible (Fig. 43H) ........ *P. carpetana* (Bolívar)

20. T7 gland with a pair of deep pouches extending far beyond anterior border of tergite (Fig. 26D) ........................................ *P. tenebricosa*, spec. nov.
– T7 with no or only short pouches not extending beyond the anterior border of the tergite ...... 21.

21. Anterior process and median ridge of T7 pit almost missing, pits reduced to narrow transversal furrows (Fig. 21F) ........................................ *P. sulcata*, spec. nov.
– Anterior process, median ridge and pits well-developed ........................................ 22.

22. Median ridge nearly not extending behind anterior process, tuft area invaginated below surface, but in itself plane (Figs 14G,H) ........................................ *P. delospuertos*, spec. nov.
– Median ridge continuing well behind anterior process and elevating the tuft area medially more or less in full length (Fig. 18E) ........................................ 23.

23. Tuft area much narrower than the laterally remaining parts of the pit openings (Fig. 15C); surface behind openings elevated to a relatively high, broad mound modelling the pits to oblique broad troughs opening in the lateroposterior edges (Figs 15E, 16G) ........................................ *P. isolata*, spec. nov.
– Tuft area as broad as or broader than the laterally remaining parts of the pit openings (Fig. 18G); surface behind openings nearly not elevated, gland openings directed posteriorly (Figs 17E, 19D) ........................................ 24.

24. T7: ridge in tuft area low and broad (Fig. 19D), pits relatively shallow; T8: median ridge narrower, crest forming a membraneous, posteriorly tapering torus regularly segmented by narrow slots, bristles reduced (Figs 19G,H) ........................................ *P. javalambrensis*, spec. nov.
– T7: ridge in tuft area high and narrow (Fig. 18G), pits rather deep; T8: median ridge unusually broad, crest membraneous, with widely separated transversal folds, at the posterior end with numerous bristles (Figs 17H,I) ........................................ *P. laticarinata*, spec. nov.

## Description of species

### 1. *Moralesi*-subgroup

The species of this subgroup *(P. moralesi, P. septentrionalis, P. delospuertos, P. isolata, P. laticarinata, P. javalambrensis, P. sulcata)* are characterized by the transversal folds/furrows above the anterior process. Glandular pits of T8 well-developed, with median ridge and bristle knob; interocular space reddish.

#### *Phyllodromica moralesi* Fernandes, 1962
Figs 3, 9A-H, 10A-P

*Phyllodromica moralesi* Fernandes, 1962: 207, figs 10 A,B; Princis 1965: 37, 45; 1971: 1106; Harz 1976: 297, figs 1027-1031.

**Types.** Holotype: ♂, Tapada de Mafra; allotype, ♀ and 4 paratypes, 2♂♂, 2♀♀, same data as holotype (Museu Bocage, Lisboa); 1♂ paratype, Soure (Laboratório de Biologia Florestal de Lisboa). All types destroyed by a fire. Neotype, herewith designated, ♂, Portugal, Distr. Lisboa, Cheleiros (10 km S Mafra), 50 m, 19.IV.1991, leg. Bohn (on two slides, Po9/5).

**Additional material. Portugal.** Distr. Lisboa: Po 8, 9 (same data as neotype), 10. Distr. Leiria: Po 11. Distr. Santarém: Po 12. **Spain.** Prov. Salamanca: Sp 170 (♀), 171a, 172a, 174(a), 225. Prov. Salamanca/Cáceres: Sp 173a, 226. Prov. Cáceres: Sp 175 (♀), 233. Prov. Cáceres/Avila: 176 (♀). Prov. Segovia: Sp 439. Prov. Madrid: Sp 5a. Prov. Toledo: Sp 295. Prov. Ciudad Real: Sp 11a, 290, 291, 294. Prov. Guadalajara: Sp 335. Prov. Cuenca: Sp 95 (♀).

**Description**

Size. Portuguese specimens. Length of pronotum: ♂ 1.86-2.05 (mean 1.98) mm, ♀ 2.11-2.37 (mean 2.23) mm; length of wings: ♂ 2.08-2.53 (mean 2.31) mm. Spanish specimens. Length of pronotum: ♂ 1.54-1.79 (mean 1.7) mm, ♀ 1.92-2.18 (mean 2.08) mm; length of wings: ♂ 1.73-2.14 (mean 1.95) mm.

Wings. Male: Forewings from touching each other to well separated, reaching or surpassing the posterior border of the metanotum, egg-shaped, broadest behind the middle, apex broadly rounded. Hindwings clearly set off. Female: Forewings widely separated, hatchet-shaped (Fig. 10P) or rounded hatchet-shaped (Fig. 10O). Hindwings absent.

Colouration. Male: Pronotum. Disk dark (Fig. 9A) or orangish (Fig. 9C), semicircular or rounded triangular, anteriorly often extending up to the anterior border of the pronotum, and interrupting there the whitish transparent margin. In animals with orange disk central part of mesonotum also orange. Tergites. Lightly coloured margins relatively broad. Head. Interocular space reddish. Legs. Whitish distal zone of coxa may comprise nearly half of the coxa length. – Female: Pronotum as in male; individuals with reddish pronotum may also have a variously lightened meso- and metanotum, but individuals with dark pronotum never with yellowish patches in the dark central area of meso- or metanotum (compare with females of *P. septentrionalis* and of the *sacarraoi*-subgroup). Tergites. Patchy zone broad, nearly as broad as the remaining dark anterior area. Head. Interocular space or complete face reddish. Legs variously lightened, often almost completely yellowish.

Male tergite structures. Posterior borders of T6 moderately, of T7 more strongly, of T8 weakly concave, of T10 convex, narrowly parabolic. Glandular pits of T7 (Figs 9E,F, 10D,H,I) open bowl-shaped, in outline semicircular, anterior walls often deepened to shallow pouches (Fig. 10H); median ridge well-developed, relatively narrow, anterior process not well set off, posterior part of ridge broadening to a pyramidal structure bearing the very extended bristle tuft (Figs 10H,I); above (anteriorly) the ridge with weak transversal folds (arrow in Fig. 9F); segment surface behind the pit openings with an extended and rather prominent dome-shaped elevation (Fig. 9E). Pits of T8 (Figs 9G,H, 10E,G) open bowl-shaped, posterior walls deepened to shallow pouches; median ridge well-developed, crest of ridge membraneous (Fig. 10G) posteriorly ending in a well-developed bristle knob (Fig. 9H).

Male genitalia. Hook of left phallomere. Shaft straight, with sclerotized trough along its apical ½.

**Remarks**. The type material has been lost in 1979 by a fire in which the complete collection of the Museu Bocage was destroyed. Since I could not find any other species of the *carpetana*-group in the further surroundings of the locus typicus (Tapada de Mafra) – the next locality with other species is as far as about 160 km away – I have no doubt about the correct designation of the neotype. The Portuguese specimens differ in several aspects from those of central Spain: 1. They are considerably larger (see size). 2. They have broader wings almost touching each other; the Spanish forms usually have well separated wings. 3. Forms with reddish pronotum disk are mainly found among the Portuguese populations; there was only one Spanish locality (Sp 225) near the Portuguese frontier containing one female with orange pronotum.

**Geographical distribution** (Fig. 3). Dispersed in the central and western part of the Iberian peninsula, at altitudes between 50 (Atlantic coast) and 1700 m.

**Accompanying species, discrimination of females**. *P. acuminata* (Sp 171, 172, 174, 225): pronotum disk with lateral extensions, interocular space dark; *P. carpetana* (Sp 5) and *P. acarinata* (Sp 295): Wings narrower, interocular space dark; *P. globososacculata* (Sp 11, 335): indistinguishable except for individuals which have a pair of light markings on the meso- or metanotum.

### *Phyllodromica septentrionalis*, spec. nov.

Figs 3, 11A-H, 12A-N

**Holotype**: ♂, Portugal, Distr. Coimbra/Leiria, Serra da Lousã, betw. Espinhal & Campelo, 800 m, 21.IV.1991, leg. Bohn (on two slides, Po 13/3).

**Additional material**. **Portugal**. Distr. Bragança: Po 24 (♀). Distr. Vila Real: Po 26. Distr. Guarda: 2♀♀, Guarda; 1♀, Manteiga, Sa. Estrela, 5.VI.59, Morales (MNHNM); Po 16, 17. Distr. Coimbra: Po 15. Distr. Coimbra/Leiria: Po 13 (same data as holotype). Distr. Leiria: Po 14. **Spain**. Prov. Orense: Sp 318. Prov. León: Sp 152 (♀), 153, 159 (♀), 320, 323. Prov. Salamanca/Cáceres: Sp 227. Prov. Palencia: Sp 133, 134. Prov. Valladolid: Sp 433. Prov. Burgos: Sp 84a (♀). Prov. Soria: Sp 330.

**Etymology**. The name of the species refers to the more northern distribution of the species as compared to the very similar species *P. moralesi*.

**Description**

Size. Length of pronotum: ♂ 1.6-1.86 (mean 1.76) mm, ♀ 1.92-2.24 (mean 2.12) mm; length of forewings: ♀ 1.92-2.37 (mean 2.12) mm.

Wings. Male: Forewings touching each other or nearly so, at least reaching or surpassing the posterior border of the metanotum, egg-shaped, broadest behind the middle, apex broadly rounded. Hindwings clearly set off. Female: Forewings widely separated, hatchet-shaped (Fig. 12N) or rounded hatchet-shaped (Fig. 11D). Hindwings absent.

Colouration. Male: Pronotum. Disk dark (Fig. 11A), sometimes orangish (Fig. 11C), semicircular; whitish margin anteriorly often very narrow, but disk rarely reaching the anterior border of the pronotum; in individuals with orangish disk central part of the mesonotum also of the same colour. Head. Interocular space reddish. Legs. Whitish distal part of the coxa may comprise half of its length, tibia and femur often variously lightened. Female: Pronotum as in male with dark or orangish disk. Individuals with dark disk may have yellowish patches on meso- and metanotum (Fig. 11D), usually close together and often near to or in connection with the light posterior border (compare with *P. globososacculata*, Fig. 31D). Tergites. Patchy zone broad, nearly as broad as remaining anterior dark area. Head. Interocular space or complete face reddish. Legs. Variously lightened, often nearly completely yellowish; but dorsal (anterior) edge of femora at least partly dark (difference to the otherwise very similar *P. moralesi* and *P. globososacculata*).

Male tergite structures. Posterior borders of T6 moderately, of T7 strongly, of T8 weakly concave, of T10 convex, narrowly parabolic. Glandular pits of T7 (Figs 11E,F, 12D,G) with ill-defined lateral and posterior borders, rather shallow, with only weak pouches; median ridge broad, anterior process not set off, above ridge (anteriorly) with weak tranversal folds (Fig. 11F); bristle tuft less extended than in preceding species but still quite large, more or less invaginated, on top of an elevation which is not much broader than the bristle tuft and which gradually slopes down towards the posterior border of the segment (Fig. 11E). Glandular pits of T8 (Figs 11G,H, 12E,H) open bowl-shaped, separated by a well-developed median ridge with membraneous crest (Fig. 12H); bristle knob highly elevated above the crest (Fig. 11H); posterior walls of pits possibly deepened to very shallow pouches (arrow in Fig. 12H). Elevation behind the pits tripartite by two shallow longitudinal depressions near the middle (Fig. 11G).

Male genitalia. Hook of left phallomere. Shaft straight, or nearly so, with sclerotized trough along its apical ½.

**Geographical distribution** (Fig. 3). Dispersed in the northern part of the Iberian peninsula, at altitudes of 300-1500 m. The gap in the distribution between the rivers Mondego and Douro in Portugal is presumably due to the absence of collecting data in this region.

**Accompanying species, discrimination of females**. *P. fernandesiana* (Po 17, Sp 134, 153): coxa usually half dark and half whitish, interocular space dark; *P. acuminata* (Sp 227): pronotum disk with lateral extensions, interocular space dark; *P. carpetana* (Po 26, Sp 227): wings narrower, interocular space dark; *P. barbata* (Sp 134): legs for the most part dark, interocular space dark; *P. globososacculata* (Sp 134, 330): often not unambiguously distinguishable, more central position of yellow markings on meso- and metanotum (if present), femora without dark dorsal edge.

## *Phyllodromica delospuertos*, spec. nov.

Figs 3, 13A-H, 14A-O

**Holotype**: ♂, Spain, Prov. Tarragona, surr. of Los Puertos (ca. 20 km W Tortosa), 750-1400 m, 11.IV.1992, leg. Bohn (on two slides, Sp 265/1).

**Additional material**. **Spain**. Prov. Tarragona: Sp 265 (same data as type). Prov. Castellón: Sp 266, 365.

**Etymology**. The name of the species refers to the distribution area, frequently in combination with the name puertos – Puertos de Beseit, Los Puertos (locality and region).

**Description**

Size. Length of pronotum: ♂ 1.76-1.86 (mean 1.78) mm, ♀ 1.92-2.11 (mean 2.02) mm; length of wings: ♂ 1.28-1.47 (mean 1.39) mm.

Wings. Both sexes. Forewings widely separated, scarcely longer than mesonotum, reversely egg-shaped, apex acutely (Fig. 14O) or obtusely (Fig. 14N) rounded. Hindwings missing.

Colouration. Male: Pronotum. Disk dark, semicircular, lateroposterior edges sometimes with weak lateral extensions. Tergites with relatively broad light posterior margins (as compared to the following three species). Head. Interocular space reddish. Legs. Whitish distal zone of coxa not longer than ¼ of its length; often tibia and, sometimes, also distal part of femur slightly lightened. Female: Pronotum as in male. Tergites very dark, patchy zone almost missing except possibly laterally. Head. Interocular space, sometimes complete face, reddish. Legs often moderately lightened to a various extent. Wings (both sexes) often with infuscated margins.

Male tergite structures. Posterior borders of T6 moderately, of T7 strongly angularly, of T8 weakly concave, of T10 convex, between narrowly and broadly parabolic (usually less broadly rounded than appearing on Fig. 14F). Glandular pits of T7 (Figs 13D-F, 14D,G,H) forming rather deep posteriorly diverging troughs (Figs 13D, 14G,H) medially ending at the median ridge in relatively deep pouches (arrows in Figs 14G,H); between the troughs posteriorly with a rounded elevation bearing the bristle tuft (Fig. 13E). Anterior process well set off (Figs 13E,F), completely covering the median ridge, in dorsal view rounded triangular, along its posterior border with a sharp edge, surface above (anteriorly) with a wide transversal depression with weak transversal furrows/folds. Bristle tuft behind the median ridge deeply invaginated, narrow, much narrower than the remaining parts of the pit openings on either side of the tuft. Glandular pits of T8 (Figs 13G,H, 14E,I) open bowl-shaped, posterior walls rarely deepened to very shallow pouches, median ridge with a crest consisting of an unregularly folded membrane and ending posteriorly in a little prominent bristle knob (Fig. 13H).

Male genitalia. Hook of left phallomere. Shaft straight or nearly so, with sclerotized trough along its apical ½ (or slightly more).

**Remarks**. This and the following four species *(P. isolata, P. laticarinata, P. javalambrensis, P. sulcata)* are very closely related. They are characterized by the narrow and short forewings being scarcely longer than the mesonotum in both sexes; other species with similar wing size have very different T7 *(sacarraoi*-subgroup: *P. tenebricosa)* or T8 gland structure *(barbata*-subgroup: *P. carpetana, P. acarinata).* T7 glandular pits of males with a distinct anterior process (not found in *P. moralesi* and *P. septentrionalis*) and a strongly invaginated bristle tuft (already indicated in *P. septentrionalis*). One may ask whether it is justified to consider the five forms as different species. Their distribution – at least three of the forms have a more or less extended distribution with only little variation in their structures – indicates that the five forms should at least be treated as subspecies. Thus an eventually necessary change of the status, from species to subspecies, would cause only relatively slight nomenclatory changes. Until either a sympatric occurrence of the species is observed or intermediate forms are found a final decision about their state is impossible. I prefer to consider them preliminarily as different species.

**Geographical distribution** (Fig. 3). Found in the mountains west of the Ebro Delta: Puertos de Beseit and the southern adjacent mountains, at altitudes of 750-1400 m.

## *Phyllodromica isolata*, spec. nov.

Figs 3, 15A-I, 16A-N

**Holotype**: ♂, France, Dept. Aude, Mt. Milobre de Mossac (btw. Soulatgé & Auriac), 850-900 m, 21.V.1996, leg. Bohn (on two slides, F 81/2).

**Additional material**. **France**. Dept. Aude: F 43(a), 81 (same data as holotype).

**Etymology**. The name of the species refers to its occurrence far from its next relatives.

**Description**

Size. Length of pronotum: ♂ 1.79-1.92 (mean 1.89) mm, ♀ 2.08-2.27 (mean 2.16) mm; length of forewings: ♂ 1.34-1.6 (mean 1.49) mm.

Wings. Both sexes. Forewings widely separated, scarcely longer than mesonotum, reversely egg-shaped, apex acutely or obtusely rounded. Hindwings missing.

Colouration. Male: Pronotum. Disk dark, rounded trigonal, lateroposterior edges usually acutely produced. Head. Interocular space reddish. Tergites. Lightly coloured posterior margins quite narrow. Legs. Whitish distal zone of coxa not longer than ¼ of its length, tibia rarely lightened. Female:

Pronotum. Disk similar as in male, but edges less pronounced, almost semicircular. Tergites. Lightly coloured posterior margins very narrow, patchy zone except possibly laterally almost missing. Head as in male. Legs. Dark as in males or, to a various extent, moderately lightened. Wings (both sexes) often with infuscated margins.

Male tergite structures. Posterior borders of T6 moderately, of T7 strongly angularly, of T8 weakly concave, of T10 convex, narrowly parabolic. Glandular pits of T7 (Figs 15C,E,F, 16D,G) very similar to the preceding species forming broad oblique troughs, medioanteriorly ending in shallow pouches (Figs 15C, 16G), between the troughs posteriorly with a rounded elevation bearing the tuft area (Fig. 15E). Anterior process with rounded edges, surface above (anteriorly) with a transversal depression with weak transversal furrows/folds (Fig. 15F). Median ridge behind anterior process continuing into the deeply invaginated tuft area leaving only laterally, along the border, unelevated narrow stripes (Figs 15C, 16G); ridge anteriorly narrower than posteriorly. Tuft area long and narrow, broadest posteriorly and slightly narrowing anteriorly, at its broadest position much narrower than the width of the pit openings on either side of the tuft area. Glandular pits of T8 (Figs 15 D,G-I, 16E,H) open bowl-shaped, posterior walls deepened to very shallow pouches (Figs 15D, 16H), median ridge relatively narrow, with a membraneous crest moulded in regular transversal folds, at the end with bristles (bristle knob) (Figs 15H,I).

Male genitalia. Hook of left phallomere. Shaft straight, with sclerotized trough in its apical ½.

**Geographical distribution** (Fig. 3). Found at two neighbouring localities in the Corbières, in southern France near the Pyrenees, at altitudes of 850-900 m.

### *Phyllodromica laticarinata*, spec. nov.

Figs 3, 17A-I, 18A-O

**Holotype**: ♂, Spain, Prov. Teruel, Montes Universales, 5 km W Frías de Albarracín, 1600 m, 5.VI.1985, leg. Bohn (on two slides, Sp 99/5).

**Additional Material. Spain**. Prov. Teruel: Sp 99 (same data as type) (a), 465, 468.

**Etymology**. The name of the species refers to the unusually broad median ridge of the glandular pits of T8.

**Description**

Size. Length of pronotum: ♂ 1.6-1.82 (mean 1.69) mm, ♀ 1.86-2.14 (mean 2.02) mm; length of forewings: ♂ 1.25-1.44 (mean 1.32) mm.

Wings. Both sexes. Forewings widely separated, scarcely longer than mesonotum, reversely egg-shaped, apex acutely (Fig. 18O) or obtusely rounded (Fig. 18N). Hindwings missing.

Colouration. Male: Pronotum. Disk dark, semicircular (Fig. 17A) or – when the posterior part is slightly more extended – rounded triangular (Fig. 17B); the whitish-transparent margins often, especially near the lateroposterior edges, infuscated. Tergites. Lightly coloured posterior margins very narrow. Head. Interocular space reddish. Legs. Whitish distal zone of coxa not longer than ¼ of its length, tibia rarely lightened. Female: Pronotum. Disk dark, semicircular. Tergites. Lightly coloured posterior margins very narrow, patchy zone restricted to the lateral parts of the tergites. Head as in male. Legs often moderately lightened to a various extent. Wings (both sexes) often with infuscated margins.

Male tergite structures. Posterior borders of T6 moderately, of T7 strongly angularly, of T8 weakly concave, of T10 convex, semicircularly rounded (usually less broadly rounded than appearing on Fig. 18F). Glandular pits of T7 (Figs 17E-G, 18D,G). Central elevation behind openings very low (Fig. 17F), posterior borders of pits, therefore, ill-defined; pits anteriorly with relatively deep pouches opening posteriorly (Figs 17E, 18G). Anterior process short, in dorsal view broadly rounded, with a sharp-edged posterior border, surface above (anteriorly) with transversal ridges and slits (arrow in Fig. 17G). Median ridge posteriorly continuing into the invaginated tuft area and elevating it medially in full length, anteriorly narrower than posteriorly (Fig. 18G). Tuft area broad, borders anteriorly diverging, at its broadest part much broader than the width of the pit openings on either side of the tuft area. Glandular pits of T8 (Figs 17H,I, 18E,H,I) open bowl-shaped, posterior walls often deepened to shallow pouches (Figs 18H,I), median ridge unusually broad, crest covered with a series of membraneous transversal folds, posteriorly diminishing in size and at the end provided with bristles (bristle knob) (Fig. 17I).

Male genitalia. Hook of left phallomere. Shaft straight, with sclerotized trough in its apical ½ (or slightly more).

**Geographical distribution** (Fig. 3). Found at three neighbouring localities in the Montes Universales in eastern central Spain, at altitudes of 1400-1600 m.

## *Phyllodromica javalambrensis*, spec. nov.

Figs 3, 19A-H, 20A-O

**Holotype**: ♂, Spain, Prov. Teruel, Sa. de Javalambre, btw. Collado de El Gavilán & Mt. Javalambre, 1600 m, 13.IV.1992, leg. Bohn (on two slides, Sp 272/4).

**Additional material. Spain.** Prov. Teruel: Sp 272 (same data as holotype), 461.

**Etymology**. The name of the species refers to the type locality.

### Description

Size. Length of pronotum: ♂ 1.54-1.66 (mean 1.61) mm, ♀ 1.82-1.92 (mean 1.87) mm (only two specimens); length of forewings: ♂ 1.15-1.38 (mean 1.29) mm.

Wings. Both sexes. Forewings widely separated, scarcely longer than the mesonotum, reversely egg-shaped, apex usually acutely rounded, sometimes obtuse or subtruncate. Hindwings missing.

Colouration. Male: Pronotum. Disk dark, semicircular. Head. Interocular space reddish. Tergites. Lightly coloured posterior margins relatively broad. Legs. Whitish distal zone of coxa not longer than ¼ of its length, tibia sometimes with lightened dorsal surface. Female: Pronotum and head as in male. Tergites. Lightly coloured posterior margins rather narrow, patchy zone missing except possibly laterally. Legs. Tibia and femur moderately lightened. Wings (both sexes) often with infuscated margins.

Male tergite structures. Posterior borders of T6 moderately, of T7 quite strongly angularly (usually stronger concave than visible on Figs 20D,I), of T8 weakly concave, of T10 convex, broadly parabolic. Glandular pits of T7 (Figs 19D-F, 20D,G,I) very similar to *P. laticarinata* but usually less deep; anterior process still shorter (Figs 19E,F), posterior border with a sharp edge, surface above (anteriorly) with strong transversal slits; median ridge quite low, of the same breadth throughout its length, especially anteriorly sparsely covered with bristles (Figs 19D, 20G) (in the two preceding species broadening towards posterior and densely covered with bristles). Glandular pits of T8 (Figs 19G,H, 20E,H) open bowl-shaped, posterior walls deepened to very shallow pouches (Fig. 20H), median ridge with crest consisting of a membraneous torus regularly segmented by narrow deepenings (Figs 19G,H); torus broad anteriorly and strongly tapering towards posteriorly, last part protruding over the surface, without bristles (or hidden beneath the posterior end of the torus as in the following species?).

Male genitalia. Hook of left phallomere. Shaft straight, with sclerotized trough in its apical ⅔.

**Geographical distribution** (Fig. 3). Found at two neighbouring localities in eastern Spain, in the Sierra de Javalambre (NW of Valencia), at an altitude of 1600 m, preferrably under *Juniperus*.

**Accompanying species, discrimination of females**. *P. globososacculata* (Sp 272): wings broader, legs often nearly completely yellowish, meso- and metanotum sometimes with yellow markings.

## *Phyllodromica sulcata*, spec. nov.

Figs 3, 21A-H, 22A-N

**Holotype**: ♂, Spain, Prov. Castellón, btw. Cinctorres & Portell de Morella (SW Morella), 1200 m, 12.IV.1992, leg. Bohn (on two slides, Sp 268/1).

**Additional material. Spain**. Prov. Castellón: Sp 268 (same data as holotype). Prov. Teruel: Sp 269(a), 270, 368, 369, 370, 372 (♀), 373, 375.

**Etymology**. The name of the species refers to the shape of the glandular pits of T7.

**Description**

Size. Length of pronotum: ♂ 1.50-1.79 (mean 1.64) mm, ♀ 1.92-2.11 (mean 2.02) mm; length of forewings: ♂ 1.21-1.41 (mean 1.28) mm.

Wings. Both sexes. Forewings widely separated, scarcely longer than mesonotum, reversely egg-shaped, apex acutely or obtusely rounded. Hindwings missing.

Colouration. Male: Pronotum. Disk dark, semicircular, lateroposterior edges sometimes slightly produced. Tergites. Lightly coloured posterior margins rather broad. Head. Interocular space reddish. Legs. Whitish distal zone of coxa not longer than ¼ of its length, tibia often lightened. Female: Pronotum. Disk dark, semicircular. Tergites. Lightly coloured posterior margins relatively narrow but broadest among the last five species, patchy zone narrow in the middle, but relatively extended laterally. Head as in male. Legs often moderately lightened to a various extent. Wings (both sexes) often with infuscated margins.

Male tergite structures. Posterior borders of T6 moderately, of T7 strongly angularly, of T8 weakly concave, of T10 convex, between narrowly and broadly parabolic. Glandular pits of T7 (Figs 21D-F, 22D,G) reduced to narrow transversal furrows, median ridge and anterior process strongly reduced, bristle tuft well-developed on a rather flat mound, invaginated as in the preceding species. Glandular pits of T8 (Figs 21G,H, 22E,H) very similar to *P. javalambrensis,* open bowl-shaped, posterior walls rarely deepened to very shallow pouches (Fig. 22H), median ridge with a crest consisting of a torus of regularly folded membrane (Fig. 21H), torus with parallel borders, at the end protruding over the surface, with some bristles beneath the posterior end.

Male genitalia. Hook of left phallomere. Shaft straight or nearly so, with sclerotized trough in its apical ½ (or more).

**Geographical distribution** (Fig. 3). Occurring in eastern Spain in the sierras between Teruel and Morella: Sa. de Gúdar and Sa. del Rayo, at altitudes of 1200-1600 m.

**Accompanying species, discrimination of females**. *P. globososacculata* (Sp 368, 370, 372): see under *P. javalambrensis* (p. 41).

### 2. *Sacarraoi*-subgroup

The species of this subgroup *(P. clavisacculata, P. tenebricosa, P. sacarraoi, P. brevisacculata, P. globososacculata, P. porosa)* are well-characterized by the structure of the glandular pits of T7 which are deepened to large pouches (secondarily reduced in *P. porosa*). Glandular pits of T8 well-developed with median ridge and bristle knob. T10 short, broadly rounded, giving the animals a rather stout appearance. Interocular space reddish. Females often with yellow patches in the dark central areas of meso- and metanotum.

Two structures which in the other subgroups are rather constant show considerable variation: the hook (see p. 20, 4th paragraph) and the subgenital plate. In the latter case the length of the apical sclerotization is to a various degree reduced (Table 3 and p. 20) presumably in connection with an elongation and/or narrowing of the posterior lobe of the subgenital plate (compare Figs 24L and 32L).

### *Phyllodromica clavisacculata,* spec. nov.

Figs 4, 23A-H, 24A-N

**Holotype**: ♂, Spain, Prov. Granada, Sierra Nevada, Solynieve (Sierra Nevada) – Pinos Genil, 1750 m, 14.VI.1984, leg. Bohn (on two slides, Sp 66/5).

**Additional material**. **Spain**. Prov. Granada: 1♀, Alfacar, Chicote! [MNNHM]; Sp 35 (♀), 36(a), 66 (same data as holotype), 67.

**Etymology**. The name of the species refers to the club-shaped gland pouches of T7.

**Description**

Size. Length of pronotum: ♂ 1.66-1.82 (mean 1.74) mm, ♀ 1.98-2.18 (mean 2.03) mm; length of wings: ♂ 2.05-2.37 (mean 2.21) mm.

Wings. Male: Forewings touching each other or nearly so (Fig. 23A, the wings of the holotype are unusually narrow), reaching the middle of T2, broadly egg-shaped, broadest behind the middle, apex broadly rounded. Hindwings well set off. Female: Forewings widely separated, scarcely longer than mesonotum, rounded hatchet-shaped.

Colouration. Male: Pronotum. Disk dark, semicircular. Tergites. Lightly coloured posterior margins relatively broad, especially in T6. T7 with large light lateroposterior edges. Head. Interocular space reddish. Legs. Whitish distal zone of coxa not longer than ¼ of its length. Tibia sometimes, especially on the dorsal side, lightened. Female: Pronotum as in male. Meso- and metanotum often with pairs of yellowish patches (Figs 23C,D). Tergites. Patchy zone broad, nearly as broad as remaining dark anterior area. Head as in male. Legs variously lightened, sometimes almost completely yellowish.

Male tergite structures. Posterior borders of T6 and T7 deeply angularly concave, of T8 very weakly concave, of T10 convex, broadly rounded. T6 rather long; anterior border with deep lateral excavations, towards the middle forming pronounced edges. Glandular pits of T7 (Figs 23E,F, 24D,G) with wide openings leading into large club-shaped pouches surpassing the anterior border of the segment at least by a segment length (Fig. 24D). Bristle tuft on the broad median ridge separating the openings (Fig. 24G), no anterior process set off (Fig. 23F). Openings at the lateroposterior edges continuing into rims running to the posterior border of the segment, area in between slightly elevated (Fig. 23E). Pits of T8 (Figs 23G,H, 24E,H) open bowl-shaped, posterior borders more or less transversal, regularly with shallow pouches (Fig. 24H); median ridge with a very prominent bristle knob, posteriorly set off from the ridge by lateral furrows with short bristles (Fig. 23H); crest of ridge membraneous (Fig. 24H).

Male genitalia. Hook of left phallomere. Shaft straight, sclerotized trough in the apical ½ of its length.

**Geographical distribution** (Fig. 4). Restricted to a small area in the western part of the Sierra Nevada, at altitudes of 1500-2000 m.

## *Phyllodromica tenebricosa*, spec. nov.

Figs 4, 25A-I, 26A-N

**Holotype**: ♂, Spain, Prov. Granada, Sierra Nevada, Loma del Riachuelo (N Mecina Bombarón), 2150-2600 m, 10.VI.1991, leg. Bohn (on two slides, Sp 247/2).

**Additional material**. **Spain**. Prov. Granada: 1♂ (terminalia on slide Bo 162), 1♀, Sierra Nevada, Puerto de la Ragua, I.Mateu-A.Cobos; 4♀♀, Pto. Ragua, 2000 m, 12.VII.1903, Escalera; 2♀♀, Sierra Nevada, Horcajo Trevélez, 15.-30.VI.1953, I.Mateu-A.Cobos [MNNHM]; Sp 28(a), 32a,b, 33(a,b), 65 (♀), 71 (♀), 242, 245, 246, 247 (same data as holotype), 249, 254. Prov. Almería: Sp 24a, 191, 235, 237-241, 243, 244, 259.

**Etymology**. The name of the species refers to the dark colouration (pronotum, wings) of the animals.

### Description

Size. Length of pronotum: ♂ 1.54-1.79 (mean 1.64) mm, ♀ 1.86-2.14 (mean 2.03) mm; length of forewings: ♂ 1.18-1.41 (mean 1.31) mm.

Wings. Male: Forewings widely separated, slightly longer than mesonotum, reversely egg-shaped, apex obtusely rounded, sometimes nearly truncate. Hindwings absent. Female: Forewings similar as in males, usually more acutely rounded, scarcely longer than mesonotum. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular (Fig. 25C), whitish margins often infuscated, in the extreme reduced to narrow lines (Fig. 25A). Wings very dark: dark patches larger than normal, margins infuscated. Tergites. Whitish margins often infuscated, T7 almost completely dark. Head. Interocular space in most cases reddish, occasionally dark. Legs. Whitish distal zone of coxa not longer than ¼ of its length, tibia rarely lightened. Female: Pronotum. Disk dark, semicircular, whitish margins of pronotum usually not infuscated. Meso- and metanotum without light patches. Tergites. Lightly coloured posterior margins narrow, patchy zone only laterally more extended. Head. Interocular space reddish. Legs. Variously, in most cases only moderately lightened, but sometimes nearly yellowish.

Male tergite structures. Posterior borders of T6 and T7 moderately concave, of T8 very weakly concave, of T10 convex, broadly rounded. Anterior borders of T6 with deep lateral excavations,

towards the middle forming pronounced edges (Fig. 26C). Glandular pits of T7 (Figs 25F,G, 26D,G) similar to the preceding species, but openings further away from the posterior border of the segment (Fig. 26G), with wide openings leading into large club-shaped (Fig. 26D,G) or globular pouches (Fig. 25F) surpassing the anterior border of the segment by at least a segment length. Bristle tuft on the broad median ridge separating the openings; anterior process not set off. Openings continuing at the lateroposterior edges into rims running to the posterior border of the segment, area in between weakly elevated (Fig. 25G). Pits of T8 (Figs 25H,I, 26E,H) open bowl-shaped, posterior borders strongly converging towards the median ridge, regularly with shallow pouches (Fig. 26H). Median ridge with a prominent bristle knob, as in the preceding species posteriorly set off from the ridge by lateral furrows with short straight bristles (Fig. 25I). Crest of ridge (and knob) membraneous (Fig. 26H).

Male genitalia. Hook of left phallomere. Shaft straight, with sclerotized trough in its apical ⅓.

**Geographical distribution** (Fig. 4). In the southeastern sierras of Spain: Sierra Nevada, Sa. de los Filabres, S. de Gádor, and Sa. Alhamilla, at altitudes of 1200-2600 m.

### *Phyllodromica sacarraoi* Fernandes, 1967

Figs 4, 27A-H, 28A-N, 57H-N

*Phyllodromica sacarraoi* Fernandes, 1967: 57, figs 1A, B; Harz 1976: 296, figs 881, 882, 908, 1018-1026.

**Types.** Holotype: ♂, Spain, Prov. Jaén, Sa. de Cazorla, Pnte. las Herrerias, Mateu-Cobos coll. (terminalia on slide Bo 161); allotype, ♀, same data as holotype; paratype, 1♂, same data as holotype (not seen) [MNHNM].

**Additional material. Spain.** Prov. Jaén: Sp 16, 17, 18, 19, 20 (♀), 73, 74, 263, 285, 287. Prov. Granada: Sp 261, 279. 2♀♀, Azrou? Fez? [MNHNM].

**Description**

Size. Length of pronotum: ♂ 1.86-2.14 (mean 1.98) mm, ♀ 1.86-2.24 (mean 2.12) mm; length of forewings: ♂ 2.24-2.88 (mean 2.53) mm.

Wings. Male: Forewings touching each other or nearly so, reaching the middle of T2, rounded hatchet-shaped, broadest behind the middle. Hindwings not well set off, posterior border of metanotum only with shallow emarginations. Female: Forewings widely separated, scarcely longer than mesonotum, rounded hatchet-shaped. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular or, more often, by lateral extensions rounded triangular or transversely rhomboidal, sometimes pronotum, except for a narrow whitish border, completely dark. Head. Interocular space reddish. Legs. Whitish distal zone of coxa not longer than ¼ of its length. Legs may be variously lightened. Female: Pronotum. Disk dark, semicircular, rarely with weak lateral extensions. Mesonotum and metanotum often with yellowish patches (Fig. 27D), sometimes occupying most of the segment surface. Tergites. Patchy zone broad, nearly as broad as remaining anterior dark area. Head. At least interocular space, often complete face reddish. Legs. Variously lightened, often almost completely yellowish.

Male tergite structures. Posterior borders of T6 and T7 very deeply angularly concave, of T8 very weakly concave, of T10 truncate. T6 long; anterior borders with deep lateral excavations, towards the middle forming rather pronounced edges; transversal ridge in the middle strongly curved anteriorly (Fig. 57H) (a characteristic not found in any other species of the *carpetana*-group, Fig. 57B). – Glandular pits of T7 (Figs 27E,F, 28D,G, 57I) deepened to large club-shaped pouches which are at least reaching the length of the segment (Figs 28D,G, 57I). Bristle tuft missing (Fig. 27F), behind the median ridge with a longitudinal elevation flanked by shallow depressions, in the middle of the elevation often with a longitudinal furrow. Segment surface behind the openings slightly elevated laterally followed by a variously extended longitudinal depression (Fig. 27E). Pits of T8 (Fig 27G,H, 28E,H,I, 57K,L). Bottom of pits rather small and shallow, without pouches, in outline rounded or square (Figs 27G, 28H,I, 57L) in the lateroposterior edges elongated into troughs ascending towards the segment surface and ending at posteriorly curved transversal mounds (Fig. 27H). Median ridge low and broad; anterior part higher, about at the height of the anterior borders of the pits, and posteriorly ending with an often very slightly elevated bristle knob (arrow in Fig. 27H); posterior half of ridge very low. Highest point of the segment some distance behind the posterior border of the pits, surface from here descending towards the pits, in the middle – in continuation of the median ridge – with a low longitudinal elevation, on both sides

flanked by depressions often provided with low transversal folds (Fig. 27H). Crest of bristle knob and of median ridge anterior to it membraneous (Figs 28H,I).

Male genitalia. Hook of left phallomere. Shaft angularly bent, tapering towards the base (Fig. 57N) with sclerotized trough in about its apical ½, apically with an erect spike; neck of claw extremely long and curved, claw broadened, shovel-like.

**Geographical distribution** (Fig. 4). Occurring in the sierras north of the Sierra Nevada: Sa. de Alta Coloma, Sa. Almadén, Sa. de Cazorla, and S. de Segura, at altitudes of 700-1700 m.

**Accompanying species, discrimination of females**. *P. globososacculata* (Sp 263) and *P. brevisacculata* (Sp 279): The females are virtually indistinguishable.

### *Phyllodromica brevisacculata*, spec. nov.

Figs 4, 29A-H, 30A-N

**Holotype**: ♂, Spain, Prov. Granada, Sa. de la Sagra, Collado Blanco, 1650 m, 16.VI.1991, leg. Bohn (on two slides, Sp 260/8).

**Additional material**. **Spain**. Prov. Murcia: Sp 278. Prov. Granada: Sp 202, 260 (same data as holotype), 279.

**Etymology**. The name of the species refers to the comparatively small size of the glandular pouches of T7.

**Description**

Size. Length of pronotum: ♂ 1.54-1.76 (mean 1.68) mm, ♀ 1.92-2.14 (mean 2.03) mm; length of forewings: ♂ 1.41-1.86 (mean 1.65) mm.

Wings. Male: Forewings well separated (slightly less than wing breadth), reaching approximately the middle of the metanotum, rounded hachet-shaped to broadly egg-shaped. Hindwings absent. Female: Forewings widely separated, scarcely longer than mesonotum, (rounded) hatchet-shaped. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular (Fig. 29A), rarely – by lateral extensions – elliptical (Fig. 29C). Tergites. Whitish margins relatively broad. Head. Interocular space, often complete face reddish. Legs. Whitish distal zone of coxa not longer than ¼ of its length. Legs often variously lightened, sometimes nearly completely yellowish. Female: Pronotum. Disk dark, semicircular, rarely with weak lateral extensions (Fig. 29D). Meso- and especially metanotum often with pairs of yellowish patches. Tergites. Patchy zone usually broad, nearly as broad as remaining anterior dark area. Head as in male. Legs variously lightened, often almost completely yellowish.

Male tergite structures. Posterior borders of T6 and T7 moderately concave, of T8 nearly straight, of T10 convex, broadly rounded. Lateral excavations at the anterior border of T6 moderately deep, towards the middle with or without (Fig. 30C) pronounced edges. Glandular pits of T7 (Figs 29E,F, 30D,H) deepened to thimble-shaped pouches of less than segment length, scarcely broadening beyond openings (Figs 29E, 30D,H). Pouches not opening on the surface of the segment but into a lowered atrium (Fig. 29F). Median ridge integrated into a large longitudinal elevation (bulge) on the floor of the atrium; bulge broadly conical, tapering towards posterior, almost completely covered by the bristle tuft, at its broadest part about as broad as the pit opening (Figs 29E, 30H). Segment surface behind the atrium slightly elevated, laterally on each side bordered by a depression leading at the lateroposterior edges down to the atrium (Fig. 29F). Pits of T8 (Figs 29G,H, 30E,G) open bowl-shaped; posterior walls regularly deepened to shallow pouches (Fig. 30G), posterior borders transversal. Median ridge bearing a prominent bristle knob (higher than in *P. sacarraoi*), bristle knob usually fully sclerotized, crest of ridge anteriorly to the knob membraneous. Behind pits with a towards the pits descending surface having a longitudinal median elevation, on both sides flanked by depressions (not well seen in Fig. 29G).

Male genitalia. Hook of left phallomere. Shaft slightly curved, sclerotized trough only in the apical ⅓ or less, at the apical end of the shaft with a strong dent; stalk of the same length as the claw, claw reaching up to the dent.

**Geographical distribution**. (Fig. 4) The species is found in the mountains east of the Sa. de Segura: Sa. de la Sagra and Sa. de Taibilla, at altitudes of 1300-1650 m.

**Accompanying species, discrimination of females**. *P. sacarraoi* (Sp 279): The females cannot be distinguished.

### *Phyllodromica globososacculata*, spec. nov.

Figs 4, 31A-H, 32A-N

**Holotype**: ♂, Spain, Prov. Cuenca, Sa. de Mira, Mt. Rebollo, 1250 m, 13.IV.1992, leg. Bohn (on two slides, Sp 274/1).

**Additional material. Portugal**. Distr. Bragança: Po 23 (♀). **Spain**. Prov. León: Sp 154, 158, 319. Prov. León/ Palencia: Sp 131. Prov. Palencia: Sp 123, 134, 431, 432. Prov. Burgos: Sp 84 (a), 135, 414, 423, 440, 441, 442. Prov. Segovia: Sp 437. Prov. Madrid: Sp 88. Prov. Toledo: Sp 296, 297. Prov. Ciudad Real: Sp 11. Prov. Jaén: Sp 263. Prov. Logroño/Burgos: Sp 83. Prov. Soria: Sp 4 (♀), 330, 331, 444. Prov. Segovia/Guadalajara: Sp 185. Prov. Guadalajara: Sp 332, 333. Prov. Cuenca: Sp 96, 97, 98, 274 (same data as holotype). Prov. Albacete: Sp 12(a), 13(a), 14a, 264. Prov. Zaragoza: Sp 379. Prov. Teruel: Sp 99a, 100, 272, 368 (♀), 370, 372, 374, 377, 378, 460, 464, 465, 466, 467, 468, 469, 470 (♀), 471 (♀). Prov. Cantabria: Sp 429.

**Etymology**. The name of the species refers to the globular shape of the glandular pouches of T7.

**Description**

Size. Length of pronotum: ♂ 1.70-1.98 (mean 1.88) mm, ♀ 2.18-2.37 (mean 2.21) mm; length of forewings: ♂ 1.54-2.02 (mean 1.78) mm.

Wings. Male: Forewings well separated by about the breadth of the wings, approximately reaching the middle of the metanotum, rounded hatchet-shaped. Hindwings absent. Female: Forewings widely separated, scarcely longer than mesonotum, rounded hatchet-shaped to reversely egg-shaped (Fig. 30N). Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular or, quite often by lateral extensions, transversely elliptical. Head. Interocular space reddish. Legs. Whitish distal zone of coxa not longer than ¼ of its length, distal parts sometimes variously lightened. Female: Pronotum. Disk dark, semicircular, rarely with weak lateral extensions. Meso- and metanotum often with yellowish pairs of patches. Tergites. Patchy zone broad, nearly as broad as remaining anterior dark area. Head. Interocular space or complete face reddish. Legs. Variously lightened, often almost completely yellowish.

Male tergite structures. Posterior borders of T6 moderately, of T7 strongly, of T8 weakly concave, of T10 convex, broadly rounded. Lateral excavations on the anterior border of T6 relatively shallow, but with prominent edges towards medial. Glandular pits of T7 (Figs 31E,F, 32D,H) deepened to large globular pouches of at least segment length, as in the preceding species opening into a lowered atrium (Fig. 31E); longitudinal bulge bearing the bristle tuft much smaller than in *P. brevisacculata*, very weakly conical or oval, at its broadest part not broader than half of the pit opening (Fig. 32H); bottom of atrium between the bulge and the lateral borders of the pouch openings elevated to a low mound of irregular shape. Segment surface behind atrium slightly elevated. Pits of T8 (Figs 31G,H, 32 E,G) quite variable, in outline circular or oval, rounded square or rounded rectangular; posterior walls regularly deepened to shallow pouches (Fig. 32G). Median ridge similar as in *P. sacarraoi*, anterior half higher than posterior half, bristle knob very low, almost integrated into the completely sclerotized ridge (arrow in Fig. 31H). Behind pits with a surface descending towards the pits, having a median longitudinal elevation, on both sides flanked by depressions (Fig. 31G). Anterior and lateral borders of the pits often with numerous small glandular pores (Figs 31H, 32G).

Male genitalia. Hook of left phallomere. Shaft curved, with sclerotisized trough only in its apical ¼, apically with a sharp dentlike edge; stalk long and slender, claw not reaching the dental edge.

**Remarks**. The species shows considerable variation in the structures of the glandular pits of T7 and T8, which is at least partly correlated with its distribution. The southern population (south of the 39th parallel) – separated by a larger gap from the northern population – deviates from the typical form especially by its T8 glandular pits having no posterior pouches and nearly no glandular pores; in T7 the elevations on the bottom of the atrium are missing. Since I am not sure that there is really a gap in the distribution I hesitate to consider it as a separate subspecies.

**Geographical distribution** (Fig. 4). *P. globososacculata* is one of the most widely distributed species of the *carpetana*-group occurring from the Sa. de Cazorla in the south up to the Picos de Europa in the north, at altitudes of 500-1700 m.

**Accompanying species, discrimination of females**. *P. fernandesiana* (Sp 82, 83, 123, 132, 154): coxa usually half dark half whitish, interocular space dark; *P. carpetana* (Sp 297, 322) and *P. acarinata* (Sp 185): wings narrower, legs for the most part dark; interocular space dark; *P. javalambrensis* (Sp 272) and

*P. sulcata* (Sp 370): wings narrower, legs for the most part dark; *P. septentrionalis* (Sp 134): dorsal edges of femora at least partly dark; *P. barbata* (Sp 123, 131, 134, 158): interocular space dark, legs for the most part dark; *P. sacarraoi* (Sp 263) and *P. moralesi* (Sp 11, 335): females not distinguishable.

### *Phyllodromica porosa*, spec. nov.

Figs 4, 33A-H, 34A-O

**Holotype**: ♂, Spain, Pov. Granada/Almería, Sa. de Lucar, btw. Oria & Cúllar Baza, 1200 m, 16.IV.1992, leg. Bohn (on two slides, Sp 283/2).

**Additional material. Spain**. Prov. Granada/Almería: Sp 283 (same data as holotype). Prov. Almería: Sp 280, 282.

**Etymology**. The name of the species refers to the large and numerous glandular pores found on T8.

**Description**

Size. Length of pronotum: ♂ 1.63-1.92 (mean 1.80) mm, ♀ 1.98-2.18 (mean 2.04) mm; length of forewings: ♂ 1.6-2.11 (mean 1.84) mm.

Wings. Male: Forewings. Size and shape variable, well separated, mostly by less, sometimes by more than wingbreadth, length from slightly longer than mesonotum up to nearly reaching the posterior border of the metanotum, egg-shaped, broadest behind the middle. Hindwings absent. Female: Forewings widely separated, scarcely longer than the mesonotum, rounded hatchet-shaped (Fig. 34N) or obliquely so (Fig. 34O).

Colouration. Male: Rather dark. Pronotum. Disk dark, semicircular, variously extended (Figs. 33A,C), in the extreme the whitish margins reduced to narrow lines. Wings rather dark: Dark patches larger and more numerous than usual, margins often infuscated. Tergites. Whitish margins usually very narrow. Head. Interocular space reddish. Legs. Whitish distal zone of coxa not longer than ¼ of its length, tibia may be lightened. Female: Pronotum. Disk dark, semicircular, with broad whitish borders. Metanotum often with yellowish patches. Tergites. Patchy zone broad, nearly as broad as remaining anterior dark area. Head. Interocular space, or complete face reddish. Legs. Variously lightened, often almost completely yellowish.

Male tergite structures. Posterior borders of T6 very weakly concave, of T7 and T8 nearly straight, of T10 convex, broadly rounded or subtruncate. T6 very long, anterior border laterally only shallowly excavated. Surface of T7 and T8 flatter, less vaulted than in the other species of the subgroup. Glandular pits of T7 (Figs 33E,F, 34D,G) anteriorly deepened to very flat (dorsoventrally compressed) and short, in outline rounded bag-shaped pouches (Fig 34G) with narrow, crescent-shaped openings; median ridge almost absent, bristle tuft on a very slight elevation forming a longitudinal band behind the median ridge (Fig. 33F); surface between bristle tuft and the lateral borders of the pouch openings nearly in full breadth elevated to a very low mound. Posterior half of the segment covered by numerous transversal folds (Fig. 33E). Pits of T8 (Figs 33G,H, 34E,H) very shallow, triangular, anteriorly and laterally bordered by broad margins perforated by numerous large glandular pores (Figs 33H, 34H); anterior part of ridge and bristle knob (arrow in Fig. 33H) integrated into the median part of the anterior margin of the pits; median ridge behind the knob very shallow, almost obsolete, behind pits continuing into a low but clearly set off longitudinal elevation, on each side flanked by an extended but very shallow depression with numerous transversal folds (Figs 33G,H).

Male genitalia. Hook of left phallomere. Shaft curved, with sclerotized trough in its apical ⅓-¼, apically with a knoblike protrusion bearing a small apically directed denticle; stalk long but thick, claw not reaching to denticle.

**Geographical distribution** (Fig. 4). The species is found in the mountains north of the Sierra de los Filabres: Sa. de María and Sa. de Lucar, at altitudes of 1200-1400 m.

### 3. *Barbata*-subgroup

The species of the *barbata*-subgroup (*P. barbata, P. acuminata, P. lativittata, P. rhomboidea, P. carpetana, P. acarinata, P. crassirostris, P. tenuirostris, P. bolivariana, P. atlantica, P. fernandesiana*) are characterized by the T8 glandular pits being very shallow and having no median ridge or being completely absent. Interocular space dark.

#### *Phyllodromica barbata*, spec. nov.

Figs 5, 35A-H, 36A-M

**Holotype**: ♂, Prov. León/Palencia, Alto de las Portillas (6 km N Guardo), 1250 m, 27.V.1987, leg. Bohn (on two slides, Sp 131/4).

**Additional material**. **Spain**. Prov. León: Sp 153 (♀), 158. Prov. León/Cantabria: Sp 129. Prov. Leon/Palencia: Sp 131 (same data as holotype). Prov. Palencia: Sp 123, 134. Prov. Burgos: Sp 424, 427. Prov. Avila: Sp 177.

**Etymology**. The name of the species refers to the very extended bristle tuft of T7, appearing on REM photographs like a beard.

**Description**

Size. Length of pronotum: ♂ 1.66-1.86 (mean 1.75) mm, ♀ 1.92-2.05 (mean 1.98) mm; length of forewings: ♂ 1.92-2.43 (mean 2.26) mm.

Wings. Male: Forewings touching each other or nearly so, reaching up to the posterior border of the second abdominal tergite, broadly egg-shaped, broadest behind the middle, apex broadly rounded. Hindwings well set off. Female: Forewings widely separated, scarcely longer than mesonotum, rounded hatchet-shaped. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular. T1-6 with relatively narrow lightly coloured borders, T7,8 variously lightened, sometimes for the most part lightly coloured, T7 at least around pits with dark markings. Head. Interocular space dark. Legs. Whitish distal part of coxa not longer than ¼ of its length, tibia rarely lightened. Female: Pronotum. Disk dark, semicircular. Meso- and metanotum without yellowish patches. Tergites. Lightly coloured posterior margins narrow, patchy zone almost missing except possibly laterally. Head. Interocular space dark. Legs. Variously, but only moderately lightened.

Male tergite structures. Posterior borders of T6 and T7 moderately concave, of T8 weakly concave, of T10 convex, semicircularly rounded. Glandular pits of T7 (Figs 35D-F, 36D,G) rather small, open bowl-shaped, in outline semicircular, sometimes with very shallow pouches anteriorly or posteriorly; median ridge very broad, with well-developed anterior process. Behind the openings with a well demarcated oval transversal elevation not reaching the posterior border of the segment (Figs 35E,F). Bristle tuft large, for the most part lying on the elevation behind the anterior process (Figs 35D, 36G). Pits of T8 obsolete, usually forming together a very shallow bipartite depression (Figs 35G,H); T8 (Fig. 36E) otherwise unsculptured.

Male genitalia. Hook of left phallomere. Shaft straight, with sclerotized trough along its apical ⅔.

**Geographical distribution** (Fig. 5). Occurring in and south of the Picos de Europa (between 3°40' and 6°W) and – at one locality – in the Sierra de Gredos, at altitudes of 850-1700 m.

**Accompanying species, discrimination of females**. *P. fernandesiana* (Sp 123, 129, 131, 134, 424): coxa usually half dark half whitish; *P. globososacculata* (Sp 123, 131, 134, 442) and *P. septentrionalis* (Sp 134): legs often for most part yellowish, interocular space reddish.

## *Phyllodromica acuminata*, spec. nov.

Figs 5, 37A-H, 38A-P

**Holotype**: ♂, Spain, Prov. Salamanca, Sa. de la Peña de Francia, Peña de Francia, 1400-1700 m, 26.IV.1992, leg. Bohn (on two slides, 171a/2).

**Additional material. Spain**. Prov. Salamanca: Sp 171(a, same data as holotype), 172(a), 174a, 225. Prov.Salamanca/Cáceres: Sp 227. Prov. Cáceres: Sp 175(a). Prov. Cáceres/Avila: Sp 176(a). Prov. Avila: Sp 178, 179 (♀), 181(a). Prov. Madrid: Sp 87.

**Etymology**. The name of the species refers to the shape of the elevation behind the glandular groove of T8.

**Description**

Size. Length of pronotum: ♂ 1.70-1.92 (mean 1.82) mm, ♀ 2.08-2.24 (mean 2.14) mm; forewings of ♂: length 2.08-2.37 (mean 2.19) mm, length/breadth: 1.35-1.61 (mean 1.5) mm.

Wings. Male: Forewings well separated, approximately reaching the middle of T2, at least surpassing the metanotum, reversely egg-shaped, apex acute-angularly rounded, broadest approximately in the middle. Hindwings well set off. Female: Forewings widely separated, scarcely longer than mesonotum, reversely broadly egg-shaped to rounded hatchet-shaped. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, broadly triangular or rhomboid by lateral extensions mostly reaching the lateral borders of the pronotum. Tergites. Whitish margins of T1-6 moderately broad. T7 usually with extended lightenings in the lateroposterior edges, the dark central marking behind pits with a posterior extension nearly reaching the posterior border of the segment. T8 mostly dark, triangular elevation yellowish. Head. Interocular space dark. Legs. Whitish distal zone of coxa not longer than ¼ of its length, dorsal half of tibia usually lightened. Female: Pronotum. Disk dark (Fig. 37C) or (rarely) reddish (Fig. 37D), broadly rounded triangular or rhomboid, lateral extensions slightly less extended than in male. Tergites. Patchy zone broad, as broad as the remaining dark anterior area. Interocular space dark. Legs. Variously, but only moderately lightened.

Male tergite structure. Posterior borders of T6 moderately, of T7 deeply concave, of T8 weakly concave, and of T10 convex, broadly parabolic. Glandular pits of T7 (Figs 37E,F, 38D,G) open bowl-shaped, in outline semicircular or triangular, with ill-defined lateral borders, separated by a relatively narrow median ridge and a much broader prominent conical anterior process (Figs 37E,F). Bristle tuft forming a relatively narrow band (Fig. 38G) running from the ridge up to a mound, arising behind the pits and sloping down towards lateroposterior edges of the openings and towards the posterior border of the segment (Fig. 37E). Pits of T8 (Figs 37G,H, 38E,H-K) together forming a kidney- or crescent-shaped, moderately deep trough (Figs 37G,H); in the posterior excavation with a, in outline, rectangular to acuteangular elevation (Figs 38H-K).

Male genitalia. Hook of left phallomere. Shaft straight, with sclerotized trough in its apical ⅔.

**Remarks**. This and the following two species *(P. lativittata* and *P. rhomboidea)* are without doubt very closely related. A common feature is the characteristic colouration pattern of the pronotum which is found in all individuals (males and females) of the three species. (Lateral extensions of the pronotum disk may also be observed in the males of *P. sacarraoi* and *P. brevisacculata* [quite frequently], and in *P. globososacculata* [occasionally], but the females of the three species only occasionally have lateral extensions). Another common characteristic is the colouration of T7 with a dark central marking reaching up to the posterior border of the segment. *P. acuminata* and *P. lativittata* show great similarities in the unique pit structures of T8, while in the pit structures of T7 the greater similarity is between *P. lativittata* and *P. rhomboidea*.

**Geographical distribution** (Fig. 5). Occurring in the central sierras of Spain: Sa. de Gata, Sa. de la Peña de Francia, Sa. de Gredos, Sa. de Guadarrama, at altitudes of 900-1700 m.

**Accompanying species, discrimination of females**. *P. moralesi* (Sp 171, 172, 174, 225): disk without lateral extensions, interocular space reddish, legs often for most part yellowish; *P. carpetana* (Sp 176, 178, 181) and *P. acarinata* (Sp 175): disk without lateral extensions, wings narrower; *P. rhomboidea* (Sp 176): indistinguishable.

## *Phyllodromica lativittata*, spec. nov.

Figs 5, 39A-H, 40A-N

**Holotype**: ♂, Portugal, Distr. Castelo Branco, Serra da Estrela, Penhas da Saúde (10 km NW Covilhã), 1500 m, 22.IV.1991, leg. Bohn (on two slides, Po 18/7).

**Additional material. Portugal**. Distr. de Castelo Branco: Po 18 (same data as holotype): 6♂♂, 10♀♀, 1 L (all imagines grown from larvae).

**Etymology**. The name of the species refers to the black marking of the pronotum forming a broad transversal band.

**Description**

Size. Length of pronotum: ♂ 1.6-1.86 (mean 1.7) mm, ♀ 1.87-2.11 (mean 1.96) mm; forewings of ♂: length 1.86-2.05 (mean 1.94) mm, length/breadth 1.54-1.57 (mean 1.55) mm.

Wings. Male: Forewings well separated, approximately reaching the middle of T2, at least surpassing the metanotum, reversely egg-shaped, broadest in or slightly behind the middle, apex narrowly or more broadly rounded. Hindwings well set off. Female: Forewings widely separated, scarcely longer than mesonotum, hatchet-shaped or rounded hatchet-shaped.

Colouration. Male: Pronotum. Disk dark, with very broad lateral extensions reaching the lateral borders of the pronotum. Tergites. Whitish margins of T1-6 moderately broad. T7 with lightly coloured lateroposterior edges, dark marking behind the pits with a posterior extension reaching the posterior border of the segment. T8 similar as T7, with a median extension of the dark area reaching the posterior boder of the segment; elevation behind pits usually yellowish. Head. Interocular space dark. Legs. Whitish distal zone of coxa not longer than ¼ of its length. Female: Pronotum. Similar as in male, but lateral extensions usually less broad. Tergites. Patchy zone about as broad as remaining dark anterior area. Head. Interocular space dark. Legs. Tibia variously lightened.

Male tergite structures. Posterior borders of T6 moderately, of T7 strongly, of T8 weakly concave; of T10 convex, broadly parabolic. Glandular pits of T7 (Figs 39E-G, 40D,G) ill-defined, shallow, median ridge and anterior process strongly reduced, pit region forming a reverse w-shaped broad transversal furrow (Figs 39E-G). Bristle tuft large, opposite the anterior process. Posteriorly adjacent segment surface with a moderately elevated mound soon sloping down towards laterally and posteriorly (Fig. 39E). Pits of T8 (Figs 39H, 40E,H) together forming a crescent-shaped, moderately deep groove; in the posterior concavity with a rounded mound.

Male genitalia. Hook of left phallomere. Shaft straight, sclerotized trough along its apical ⅔.

**Remarks**. The species is only known from one locality; all specimens had been collected as larvae and had moulted to imagines in captivity. Description of a new species based on animals grown from larvae is problematical since artefacts caused by inadequate cultivation conditions cannot be excluded. But the small differences between the specimens (7♂♂, 10♀♀) and the pronounced differences to the neighbouring species *(P. acuminata, P. rhomboidea)* in colouration and in the structure of the glandular pits of T7 and T8 leave no doubt that the establishment of a separate species for them is justified.

**Geographical distribution** (Fig. 5). Found only at one locality in the Serra da Estrela (Portugal), at an altitude of 1500 m.

**Accompanying species, discrimination of females**. *P. fernandesiana* (Po 18): Pronotum disk without lateral extensions, coxa usually half dark half whitish.

## *Phyllodromica rhomboidea*, spec. nov.

Figs 5, 41A-H, 42A-N

**Holotype**: ♂, Spain, Prov. Càceres, Pto. del Piornal (NE Plasencia), 1200 m, 24./25.IV.1992, leg. Bohn (on two slides, Sp 306/3).

**Additional material. Spain**. Prov. Càceres: Sp 306 (same data as holotype); Prov. Càceres/Avila: Sp 176(a).

**Etymology**. The name of the species refers to the shape of the pronotum disk.

**Description**

Size. Length of Pronotum: ♂ 1.79-1.98 (mean 1.89) mm, ♀ 2.02-2.24 (mean 2.13) mm; forewings of ♂: length 2.11-2.43 (mean 2.25) mm, length/breadth 1.61-1.71 (mean 1.65) mm.

Wings. Male: Forewings well separated, approximately reaching the middle of T2, narrowly reversely egg-shaped, broadest approximately in the middle, apex narrowly rounded. Hindwings well set off. Female: Forewings widely separated, scarcely longer than mesonotum, hatchet-shaped or rounded so. Hindwings absent.

Colouration. Male: Pronotum. Disk broadly triangular or transversely rhomboid, lateral extensions reaching or nearly reaching the lateral borders. Whitish margins of T1-6 moderately broad, in T6 laterally much broader than in the middle. T7 with lightly coloured lateroposterior corners separated by a broad dark marking reaching the posterior border of the segment. T8 almost completely dark. Head. Interocular space dark. Legs. Whitish distal zone of coxa not longer than ¼ of its length, dorsal half of tibia usually lighter coloured. Female: Pronotum similar as in male. Tergites. Patchy zone broad, as broad as remaining dark anterior area. Head. Interocular space dark. Legs. Variously, but only moderately lightened.

Male tergite structures. Posterior borders of T6 rather deeply, of T7 deeply, of T8 weakly concave, of T10 convex, broadly parabolic or semicircularly rounded. Glandular pits of T7 (Figs 41E-G, 42D,G,H) very shallow and small, in outline triangular or crescent-shaped, median ridge and anterior process very low, behind pits with a low transversely oval elevation, steeper anteriorly and gradually sloping down towards, but not reaching, the posterior border of the segment, and bearing the more or less circular bristle tuft (Fig. 42H). T8 without pits and without any sculpturing (Fig. 41H).

Male genitalia. Hook of left phallomere. Shaft straight or nearly so, sclerotized trough along its apical ⅔.

**Geographical distribution** (Fig. 5). Found at two localities in the western part of the Sa. de Gredos, at altitudes of 1200-1300 m.

**Accompanying species, discrimination of females**. *P. carpetana* (Sp 176, 306): disk without lateral extensions, wings narrower; *P. acuminata* (Sp 176): indistinguishable.

## *Phyllodromica carpetana* (Bolívar, 1873)

Figs 6, 43A-H, 44A-O, 57A-G

*Blatta carpetana* Bolívar, 1873: 214, figs 1A-C.

*Phyllodromica (Lobolampra) carpetana:* Fernandes 1962: 210, Figs 11 A,B; Princis 1965: 39, 45; 1971: 1111; Harz 1976: 303, Figs 868 B(?), 1061.

**Holotype**: ♂, [Spain, Prov.] Madrid, Navacerrada, Bolívar (terminalia on slide Bo 156) [MNHNM].

**Additional material. Portugal**. Distr. Bragança: Po 22. Distr. Vila Real: Po 26. **Spain**. Prov. Salamanca: Sp 307. Prov. Salamanca/Cáceres: Sp 227. Prov. Cáceres: Sp 306. Prov. Cáceres/Avila: Sp 176. Prov. Avila: Sp 177, 178, 179, 180, 181(a), 182(a), 183, 298, 299, 301, 303, 304. Prov. Segovia: 1♂, La Granja, VI.1908, Arias (terminalia on slide Bo 163); 1 L [MNHNM]. Prov. Segovia/Madrid: Sp 86. Prov. Madrid: 2♂♂, 5♀♀, 2 L, Cercedilla, C. Bolívar (terminalia of 1♂ on slide Bo 157);1 L, Cercedilla, III.1957, G. Menor; 5♀♀, Cercedilla, Estación Alpina, 1500 m, VII.1933, E. Morales; 1♀, Cercedilla, Estación Alpina, 1480 m, VIII.1959, J.Abajo; 1♂, 2♀♀, El Chaparral, Montejo de la Sierra, 14.-22.VI.[19]48, Exp. Ent. Inst. Esp. Entomología (terminalia of ♂ on slide Bo 160); 1♂, 1L, El Paular, X.1908, Arias (terminalia of ♂ on slide Bo 159) [MNHNM]; Sp 5a, 6(a). Prov. Madrid/Toledo: Sp 90. Prov. Toledo: Sp 297. Prov. Burgos/Soria: Sp 329. Prov. Guadalajara: Sp 322, 334. Prov. Zaragoza: Sp 379(a).

**Description**

Size. Length of pronotum: ♂ 1.54-1.79 (mean 1.65) mm, ♀ 1.86-2.11 (mean 2.04) mm; length of forewings: ♂ 1.22-1.54 (mean 1.37) mm.

Wings. Male: Forewings widely separated, slightly longer than mesonotum, narrowly reversely egg-shaped, apex narrowly (Fig. 44N) or broadly (Fig. 43A) rounded. Hindwings absent. Female: Forewings widely separated, scarcely longer than mesonotum, reversely egg-shaped. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular. Tergites with relative broad lightly coloured margins. Head. Interocular space dark. Legs. Whitish distal zone of coxa not longer than ¼ of

its length; tibia often, femur less frequently, variously lightened. Female: Pronotum and head as in male. Tergites. Patchy zone broad, nearly as broad as remaining dark anterior area. Legs. Variously lightened, sometimes nearly yellowish.

Male tergite structures. Posterior borders of T6 and T7 moderately, of T8 weakly concave, of T10 convex, between narrowly and broadly parabolic. Glandular pits of T7 (Figs 43D-G 46D,G-I) at least anteriorly and posteriorly well demarcated, in outline semicircular or triangular, mostly open bowl-shaped, anteriorly sometimes deepened to very shallow pouches; anterior process strong, conical or with parallel lateral borders, posteriorly rounded or truncate; median ridge behind the anterior process very low, with a deep gap between the posterior end of the anterior process and the bristle tuft (not visible on the figures); behind the pits with a rather steep but not very extended mound; bristle tuft forming a narrow band considerably recessed into this mound (Figs 43D, 44G-I). Pits of T8 (Figs 43H, 44E) shallow, but with pronounced anterior borders, separated by a broad median swelling (Fig. 43H), T8 otherwise unsculptured.

Male genitalia. Hook of left phallomere. Shaft straight, sclerotized trough along its apical ⅔.

**Geographical distribution** (Fig. 6). In the central sierras of the Iberian peninsula, radiating also into northern Portugal, up to Sa. de la Demanda in the northeast and nearly up to the Serrania de Cuenca in the east, at altitudes of 700-1800 m.

**Remarks**. The type of *P. carpetana* (Figs 57A-G) differs in one respect from all other specimens: The right-left-asymmetry of the genitalia (phallomeres, paraprocts, subgenital plate with stylus) is reversed. Reversal of the right-left-asymmetry is a characteristic of some Blattellid taxa as, for instance, the subgenus *Capraiellus* of the genus *Ectobius* (Brown 1975) and Plectopterinae, and of the Blaberidae. The reversal of the symmetry has been interpreted as being caused by the mutation of a developmental gene which must have occurred several times independently during the evolution of the Blattaria (Bohn 1987, Klass 1997). The symmetry reversal in the type specimen may have been an individual event, either by mutation or by a developmental error, or the specimen is a representative of a larger population showing the same symmetry reversal. The latter possibility is not supported by the collected material: another male from a locality near by (Cercedilla) shows normal symmetry.

It is not known whether individuals with reversed symmetry are able to cross with individuals having normal symmetry. In the case of a sexual isolation of the individuals or populations with reversed symmetry one would have to consider nomenclatorical consquences. But as long as the circumstances are not clarified and as long as the type specimen does not show any remarkable differences other than in right-left-asymmetry I feel no necessity not to consider it as the type specimen of the respective animals with normal symmetry.

**Accompanying species, discrimination of females**. *P. globososacculata* (Sp 297, 332), *P. moralesi* (Sp 5), *P. septentrionalis* (Po 26, Sp 227): wings broader, interocular space reddish; *P. fernandesiana* (Sp 329): wings broader, coxa usually half dark half whitish; *P. acuminata* (Sp 176, 178, 181, 227) and *P. rhomboidea* (Sp 176, 306): wings broader, disk with lateral extensions; *P. barbata* (Sp 177): wings usually broader, but not always unambigously distinguishable.

## *Phyllodromica acarinata*, spec. nov.

Figs 6, 45A-H, 46A-N

**Holotype**: ♂, Spain, Prov. Toledo, Mtes. de Toledo, Mt. Corral de Cantos (10 km S Navahermosa), 1000 m, 22.IV.1992, Bohn (on two slides, Sp 295/2).

**Additional material**. **Spain**. Prov. Cáceres: Sp 175(a). Prov. Avila: Sp 184. Prov. Segovia/Guadalajara: Sp 185. Prov. Madrid: 1♂, 2♀♀, 1 L, El Escorial, V.[19]34, E. Morales (terminalia of ♂ on slide Bo 158); 1 L, El Escorial, 18.III.1906, Arias [MNHNM]. Prov. Toledo: Sp 295 (same data as holotype).

**Etymology**. The name of the species refers to the glandular structure of T7 where a median ridge is almost completely missing.

### Description

Size. Length of the pronotum: ♂ 1.47-1.76 (mean 1.63) mm, ♀ 1.92-2.08 (mean 1.99) mm; length of forewings: ♂ 1.12-1.44 (mean 1.34) mm.

Wings. Male: Forewings widely separated, slightly longer than mesonotum, narrowly reversely egg-shaped, apex acutely to obtusely rounded. Hindwings absent. Female: Forewings widely separated, scarcely longer than mesonotum, reversely egg-shaped. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular. Tergites with relatively broad whitish margins. Head. Interocular space dark. Legs. Whitish distal zone of coxa not longer than ¼ of its length. Dorsal half of tibia often lightened. Female: Pronotum and head as in male. Tergites. Patchy zone may be as broad as remaining dark anterior area, usually slightly darker than in *P. carpetana*. Legs variously lightened, sometimes almost completely yellowish.

Male tergite structures. Posterior borders of T6 and T7 moderately concave, of T8 very weakly concave, of T10 convex, between narrowly and broadly parabolic. Glandular pits of T7 (Figs 45D-H, 46D,G,H) poorly demarcated except anteriorly, with a well-developed anterior process forming a short, narrowly (Fig. 46H) or broadly rounded dent (Fig. 45D); median ridge strongly reduced, beneath the anterior process weakly developed, posteriorly (between anterior process and bristle tuft) completely missing, pits of both sides, therefore, widely communicating and together forming a transversal furrow; furrow either rather wide, posteriorly ill defined by a very low mound behind the anterior process (Figs 45D, 46H), or, when the mound is higher, narrower and posteriorly, at least in the middle, better delineated (Figs 45E, 46G). Bristle tuft forming a more or less narrow band on the mound opposite the anterior process. Pits beneath the anterior process sometimes anteriorly deepened to very narrow pouches. T8 (Fig. 46E) without glandular pits, unsculptured.

Male genitalia. Hook of left phallomere. Shaft straight, or nearly so, sclerotized trough along its apical ⅔.

**Remarks**. Very similar to the preceding species *(P. carpetana)* but easily distinguished, at least on slide preparations, by the different structure of the T7 glandular pit (shape of anterior process, median ridge). There is considerable variation in the shape of the anterior process, the breadth of the bristle tuft, and width of the pit furrow between the animals from different localities, but also between different specimens from one locality.

**Geographical distribution** (Fig. 6). Found at only few localities – approximately within the distribution area of *P. carpetana*, but not at the same localities – in the central Iberian sierras: Montes de Tras la Sierra, Sa. de Guadarrama, Sa. de Ayllón, and Montes de Toledo, at altitudes of 1000-1700 m.

**Accompanying species, discrimination of females**. *P. moralesi* (Sp 295) and *P. globososacculata* (Sp 185): broader wings, interocular space reddish; *P. acuminata* (Sp 175): broader wings, pronotum disk with lateral extensions.

## *Phyllodromica crassirostris*, spec. nov.

Figs 5, 47A-H, 48A-N

**Holotype**: ♂, Spain, Prov. León, Montes de León, btw. Aceto & Monjarín, 1300 m, 4.V.1992, Bohn (on two slides, Sp 321/4).

**Additional material**. **Spain**. Prov. León: Sp 321 (same data as holotype): 21♂♂, 12♀♀, 1 L, 3♀♀ ex L.

**Etymology**. The name of the species refers to the broad and short anterior process of T7 (as compared to the following species, *P. tenuirostris*).

**Description**

Size. Length of pronotum: ♂ 1.79-1.98 (mean 1.91) mm, ♀ 1.86-2.21 (mean 2.11) mm; forewings of ♂: length 2.05-2.30 (mean 2.13) mm, length/breadth 1.64-1.82 (mean 1.7) mm.

Wings. Male: Forewings well separated, reaching approximately the posterior border of the metanotum, narrowly reversely egg-shaped, broadest near the middle, apex narrowly rounded. Hindwings only weakly set off by superficial furrows and/or slight emarginations at the posterior border of the segment. Female: Forewings widely separated, scarcely longer than mesonotum, reversely egg-shaped or rounded hatchet-shaped. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular, quite extended, whitish-transparent margins of pronotum, therefore, relatively narrow. Wings rather dark: dark patches large, margins infuscated. Tergites 1-6 with relatively narrow whitish posterior margins; T7 and T8 lighter coloured than

preceding segments, dark central marking on both segments in the middle mostly with a characteristic triangular posterior extension; pit region of T8 normally lightly coloured. Head. Interocular space dark. Legs. Whitish distal zone of coxa not longer than ¼ of its length, tibia rarely lightened in its dorsal half. Female: Pronotum. Disk dark, semicircular. Tergites. Patchy zone usually restricted to the lateral parts of the segment. Head as in male. Legs. Rarely and only moderately lightened.

Male tergite structures. Posterior borders of T6 and T7 moderately concave, of T8 weakly concave, of T10 convex, broadly parabolic. Glandular pits of T7 (Figs 47E-G, 48D,G,H) open bowl-shaped, in outline semicircular, separated by a broad median ridge and a rather short anterior process often not much longer than ½ of the ridge (Figs 48G,H), broad at the base and gradually tapering towards its broadly rounded tip; posterior borders of the openings straight; bristle tuft on the posterior part of the median ridge and on a posteriorly following moderate elevation gradually sloping laterally and posteriorly. Pits of T8 (Figs 47H, 48E) forming a shallow transversely oval depression, sometimes divided by a low median swelling; tergite surface otherwise unsculptured.

Male genitalia. Hook of left phallomere. Shaft straight, sclerotized trough along its apical ⅔.

**Remarks**. In the T7 gland structures the species is very similar to the western forms of *P. fernandesiana* (Figs 49G-I, 55D), but differs in longer forewings and the incompletely reduced hindwings. It is only known from one locality, and – having in mind the obvious ease by which wings can be reduced – one might ask whether it is justified to consider it as a separate species. Arguments for a separate species are: The pit structures are not really identical: the pits are longer and the bristle tuft is narrower than in the western population of *P. fernandesiana* (not visible on the REM photographs), the pigmentation of T7 and T8 is darker, and the dark pigmentation of the pronotum is much more extended. Moreover, the locality where *P. crassirostris* is found is still within the area of the eastern form of *P. fernandesiana* (the next locality with this species, Sp 322, is only about 10 km away) having a quite different T7 pit.

**Geographical distribution** (Fig. 5). Known only from one locality in the Montes de León, in the NE of the Iberian peninsula, at an altitude of 1300 m.

### *Phyllodromica tenuirostris*, spec. nov.

Figs 5, 49A-D, 50A-N

**Holotype**: ♂, Spain, Prov. Zamora, Padornelo (W Puebla de Sanabria), 1300 m, 11.VI.1987, Bohn (on two slides, Sp 164/5).

**Additional material**. **Spain**. Prov. León: 1♂, 1♀, Monte Teleno, 10.VII.[19]59, Cobos (terminalia of ♂ on slide Bo 167); 1♀, El Teleno, 13.VII.[19]55, Mateu [MNHNM]. Prov. Zamora: Sp 164 (same data as holotype): 1♂, 8♀♀; Sp 165: 3♂♂, 15♀♀.

**Etymology**. The name of the species refers to the comparatively (see *P. crassirostris*) narrow and long anterior process of T7.

**Description**

Size. Length of pronotum: ♂ 1.73-1.86 (mean 1.81) mm, ♀ 1.92-2.14 (mean 2.05) mm; forewings of ♂: length 1.73-2.05 (mean 1.93) mm, length/breadth 1.5-1.67 (mean 1.61) mm.

Wings. Male: Forewings well separated, approximately reaching the posterior border of the metanotum, reversely egg-shaped, broadest near the middle, apex narrowly (Figs 49C, 50M) or, rarely, broadly rounded (Fig. 49A). Hindwings only very weakly set off by superficial furrows. Female: Forewings widely separated, scarcely longer than mesonotum, rounded hatchet-shaped. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular. Tergites 1-6 with slightly broader whitish margins than in *P. crassirostris*; T7 variously lightened, often only central area around pits dark; behind pit openings characteristically with a dark transversal bar, on both sides with posterior extensions; T8: central dark area often broken up into 3 longitudinal patches. Head. Interocular space dark. Legs. Whitish distal zone of coxa not longer than ¼ of its length, dorsal half of tibia often lightened. Female: Pronotum and head as in male. Tergites. Patchy zone usually restricted to the lateral parts of the segment, but more extended than in *P. crassirostris*. Legs often, but only moderately lightened.

Male tergite structures. Posterior borders of T6 and T7 rather strongly concave, of T8 weakly

concave, of T10 convex, broadly parabolic. Glandular pits of T7 (Figs 50D,G,H) open bowl-shaped, in outline semicircular. Median ridge narrower than in *P. crassirostris*, anterior process with almost parallel lateral borders and a rounded or truncate tip, reaching nearly to the posterior end of the ridge. Bristle tuft narrow. Posterior borders of pit openings not straight but protruding anteriorly on both sides of the bristle tuft, walls of the pits beneath these protrusions posteriorly hollowed out to shallow pouches; elevation behind openings higher than in *P. crassirostris* and posteriorly well set off forming a rather narrow transversal lip (less than ½ of the segment length behind the openings); bristle tuft recessed considerably into this elevation. Pits of T8 (Fig. 50E) obsolete and very shallow depressions; segment surface otherwise unsculptured.

Male genitalia. Hook of left phallomere. Shaft straight, sclerotized trough along its apical ⅔.

**Remarks**. Externally very similar to the preceding species *(P. crassirostris)*, but well distinguishable by the more deeply concave posterior borders of T6 and T7, and the different pit structure and colouration of T7.

**Geographical distribution** (Fig. 5). Found within a small region in the NW of the Iberian peninsula, in the Montes de León, Sa. del Teleno, and Sa. de la Cabrera, at altitudes of 1300-1700 m.

**Accompanying species, discrimination of females**. *P. fernandesiana* (Sp 164): Coxa usually half dark half whitish.

## *Phyllodromica bolivariana*, spec. nov.

Figs 5, 51A-H, 52A-N

Misidentification: *Phyllodromica carpetana*: Fernandes 1962: Fig. 11 D; Harz 1976: Figs. 903, 1056, 1057, 1059.

**Holotype**: ♂, Spain, Prov. Cantabria, Picos de Europa, btw. La Vega & Enterrias, 600 m, 26.V.1986, Bohn (on two slides, Sp 127/6).

**Additional material**. **Spain**. Prov. Asturias: Sp 155. Prov. Cantabria: 1♂, 2♀♀, S. Vicente de la Barquera, VII-IX, Bolívar (terminalia of ♂ on slide Bo 169); 1♂, 1♀, Santander, VII, Delgras (terminalia of ♂ on slide Bo 168) [MNHNM]; Sp 127 (same data as holotype), 415, 430. Prov. Palencia: Sp 125. Prov. Viscaya: Sp 410, 411. Prov. Burgos: Sp 417, 418. Prov. Burgos/Álava: Sp 413. Prov. Álava: Sp 406, 412. Prov. Guipúzcoa: 1♀, San Sebastian, Escalera [MNHNM]; Sp 407, 408, 409. Prov. Navarra: Sp 121, 399, 400, 404. **France**. Dept. Pyrenées-Atlantiques: F 69, 70. Dept. Haute-Garonne: F 73. Dept. Ariège: F 74.

**Etymology**. The species is dedicated to the Spanish orthopterologist I. Bolívar who first discovered and described differences between *P. carpetana* and a representative of the new species.

### Description

Size. Length of pronotum: ♂ 1.73-2.14 (mean 1.98) mm, ♀ 2.05-2.37 (mean 2.21) mm; length of forewings: ♂ 1.76-2.5 (mean 2.27) mm, length/breadth: 1.72-1.84 (mean 1.76) mm.

Wings. Male: Forwings well separated, nearly reaching the posterior end of T2, very narrowly reversely egg-shaped, narrower than in any other species of the subgroup, broadest near the middle, apex narrowly rounded. Hindwings well set off. Female: Forewings widely separated, scarcely longer than mesonotum, rounded hatchet-shaped. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular. Tergites 1-6 with moderately broad whitish margins; T7 posteriorly and especially in the lateroposterior corners with extended light areas, central dark marking often with three triangular posterior extensions (Figs 51D,E, 52G,H); T8: anterior half mostly dark, dark marking posteriorly split into three bands, the median usually strongly trigonal. Head. Interocular space dark. Legs. Whitish distal zone of coxa comprising about ½ of its length; tibia and femur variously, but usually only moderately lightened. Female: Pronotum and head as in male. Tergites. Patchy zone usually restricted to the lateral parts of the segments. Legs variously lightened, but the dark-whitish contrast in the middle of the coxa usually well visible.

Male tergite structures. Posterior borders of T6 and T7 quite strongly concave, of T8 moderately concave, of T10 convex, broadly parabolic. T6 relatively long. Glandular pits of T7 (Figs 51D-H, 52D,G,H) open bowl-shaped, quite large, in outline semicircular, separated by a well-developed median ridge. Anterior (and lateral) wall of pits slowly declining towards the bottom of the pits (in other species with bowl-shaped pits the anterior walls are steep, in most cases even hollowed out

anteriorly); posterior walls hollowed out to shallow pouches beneath the posterior borders of the pits (Figs 51D,E); posterior borders on both sides of the narrow bristle tuft protruding anteriorly. Anterior process often slightly club-shaped by a weak basal constriction (Fig. 51H), in contrast to all other species of the subgroup ascending towards posteriorly, giving rise to a deep step between its tip and the posteriorly following median ridge with the bristle tuft. Surface behind openings elevated to an at least posteriorly well demarcated transversely oval lip (Figs 51F-H); bristle tuft considerably recessed into this elevation. Structure of T8 glandular pits somewhat similar to *P. lativittata* though much lower: pits forming together a crescent-shaped depression, posterior concavity with a rounded very flat mound; T8 otherwise unsculptured (Fig. 52E).

Male genitalia. Hook of left phallomere. Shaft straight, sclerotized trough along its apical ⅔ or ¾.

**Remarks**. Representatives of this species had already attracted the attention of earlier authors. Bolívar (1897) in his Catalogo sinoptico had mentioned an individual from Santander (slide Bo 168, s. above under material) having larger wings than the other *P. carpetana* specimens. Fernandes reported a second specimen from S.Vicente de La Barquera (not very far from Santander) (slide Bo 169) with the same characteristics and mentioned the possibility that the two might represent a local form or race. *B. bolivariana* shares the colouration of the coxa being half dark half whitish with the two following species.

**Geographical distribution** (Fig. 5). Distributed in the northern part of the Iberian peninsula between Picos de Europa in the west, the river Ebro in the south, and the river Arga in the east. The species has also been found in the northern Pyrenées in France. Altitudes: 600-1400 m.

**Accompanying species, discrimination of females**. *P. fernandesiana* (Sp 125, 127, 418): no distinction possible.

## *Phyllodromica atlantica*, spec. nov.

Figs 5, 53A-H, 54A-N

**Holotype**: ♂, Spain, Prov. La Coruña, near Villar de Torre (5 km NE Negreira), 400 m, 1.V.1992, Bohn (on two slides, Sp 311/3).

**Additional material**. **Spain**. Prov. La Coruña: Sp 311 (same data as Type): 7♂♂, 1♀, 1♂ ex L, 6♀♀ ex L.

**Etymology**. The name of the species refers to its habitat near the Atlantic Ocean.

### Description

Size. Length of pronotum: ♂ 1.98-2.24 (mean 2.09) mm, ♀ 2.14-2.24 (mean 2.22) mm; length of forewings: ♂ 2.11-2.56 (mean 2.36) mm, length/breadth: 1.55-1.67 (mean 1.60) mm.

Wings. Male: Forewings well separated, reaching nearly to the posterior end of T2, reversely egg-shaped, broadest near the middle, apex narrowly rounded. Hindwings well set off. Female: Forewings widely separated, scarcely longer than mesonotum, rounded hatchet-shaped. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular. Tergites 1-6 with relatively broad whitish posterior margins, especially broad on T6; T7 and T8 for the most part lightly coloured, dark marking sometimes reduced to few patches. Head. Interocular space dark. Legs. Whitish distal zone of coxa comprising about ½ of its length; femur and tibia variously lightened. Female: Pronotum and head as in male. Tergites. Patchy zone restricted to the lateral parts of the segments. Legs usually strongly lightened, coxa for the most part light, at the base with sharply delineated dark areas.

Male tergites structures. Posterior borders of T6 and T7 moderately concave, of T8 weakly concave, of T10 convex, broadly parabolic. Glandular pits of T7 (Figs 53D-G, 54D,G) open bowl-shaped, in outline semicircular, separated by a broad median ridge; anterior process broad at the base, gradually tapering towards the rounded tip; posterior borders of the pits nearly straight; behind openings with a rather flat elevation. Pits of T8 shallow depressions (Fig. 53H).

Male genitalia. Hook of left phallomere. Shaft straight, sclerotized trough along its apical ⅔ to ¾.

**Remarks**. In gland structure and in the light colouration of the last tergites very similar to the next species *(P. fernandesiana)*, but easily distinguished by the longer forewings and the hindwings being clearly set off. Externally also very similar to the preceding species *(P.bolivariana)* from which it is distinguished by the broader wings, the darker colouration of T8, and the different gland structures of T7 and T8.

**Geographical distribution** (Fig. 5). Known only from one locality in the extreme NW corner of the Iberian peninsula near Santiago de Compostela; altitude 400 m.

### *Phyllodromica fernandesiana*, spec. nov.

Figs 6, 49E-I, 55A-G, 56A-N

Figs in earlier papers under *Phyllodromica carpetana*: Fernandes 1962: Fig. 11c.

**Holotype**: ♂, Spain, Prov. Zaragoza, Sa. del Moncayo, below Santuario del Moncayo, 1400, 29.V.1986, Bohn (on two slides, Sp 138/2).

**Additional material. Portugal**. Distr. Viana de Castelo: Po 37, 38. Distr. Braga: Po 31, 32, 36. Distr. Vila Real: Po 27, 28, 30, 33, 34, 35. Distr. Vila Real/Porto: Po 29. Distr. Porto: 1♀, Porto, Nobre [MNHNM]. Distr. Bragança: Po 23, 24. Distr. Guarda: Po 17. Distr. Castelo Branco: Po 18. **Spain**. Prov. La Coruña: Sp 313. Prov. Pontevedra: Sp 309, 310, 314, 315. Prov. Lugo: 1♀, Piedrafita del Cabrero, 1100 m, 28.-30.VII.1949, Exp. Inst. Esp. Entomología [MNHNM]; Sp 160, 161. Prov. Orense: 1♀, Carballino, G.Varela [MNHNM]; Sp 163, 308, 316, 317. Prov. Oviedo: Sp 156. Prov. Oviedo/León: Sp 157. Prov. León: 1♂, 1♀, Truchas, VII.1959, A.Cobos (terminalia of ♂ on slide Bo 165); 1♂, Sa. de Bayos, 1400 m, 1.-10.VIII.1950, Exp. Inst. Esp. Entomología (terminalia on slide Bo 166); 1♀, Villablino, 1000 m, VII.1949, E. Morales; 2♀♀, Villablino, 1000 m, 4.-12.VIII.1949, Exp. Inst. Esp. Entomología; 1♀, Pto. Cerredo, 4.-12.VIII.1949, Exp. Inst. Esp. Entomología [MNHNM]; Sp 130, 153, 154, 322. Prov. León/Palencia: Sp 131. Prov. Zamora: Sp 164, 166, 167. Prov. Cantabria: 1♂, 2♀♀, Picos Europa, Espinama, M. Escalera (terminalia of ♂ on slide Bo 170) [MNHNM], Sp 127. Prov. Cantabria /León: Sp 129. Prov. Palencia: Sp 123, 124, 125, 132, 134, 428. Prov. Burgos: Sp 84a,b, 122, 325, 326, 327, 328, 418, 422, 424, 425, 426, 443. Prov. Burgos/ Logroño: Sp 83. Prov. Logroño: Sp 81, 82. Prov. Soria: Sp 136, 137(a), 329, 445. Prov. Zaragoza: 17♂♂, 11♀♀, 7 L, Moncayo, 17.VI.1940, E. Morales (terminalia of 1♂ on slide Bo 164); 2♀♀, Moncayo, F. Navarro; 1♀, Moncayo, VIII.1908, Navas [MNHNM]; Sp 138 (same data as holotype). Prov. Cuenca: 1♂, Uclés (terminalia on slide Bo 209) [MAKB].

**Etymology**. The species is dedicated to the Portuguese orthopterologist J. de A. Fernandes who in his revision of the Iberian Ectobiinae had already pointed out the distinct appearance of the specimens from the Sa. de Moncayo representing possibly a local form or race of *P. carpetana* (Fernandes 1962, p. 211).

**Description**

Size. Length of pronotum: ♂ 1.79-2.05 (mean 1.94) mm, ♀ 2.05-2.30 (mean 2.16) mm; length of forewings: ♂ 1.6-1.92 (mean 1.77) mm.

Wings. Male: Forewings well separated, approximately reaching the middle of the metanotum, rounded hatchet-shaped (Fig. 56C) or, rarely, reversely egg-shaped (Fig. 56M). Hindwings absent. Female: Forewings widely separated, scarcely longer than mesonotum, rounded hatchet-shaped. Hindwings absent.

Colouration. Male: Pronotum. Disk dark, semicircular. Tergites with relatively broad whitish margins; T7 and T8 usually for the most part lightly coloured, dark areas often reduced to a few patches, in T7 around the pits. Head. Interocular space dark. Legs. Whitish distal zone of coxa in most cases comprising about ½ of its length, but sometimes, especially in the western populations, only ¼ of its length or less; distal parts of legs often lightened. Female: Pronotum and head as in male. Tergites. Patchy zone variously extended, either only laterally or over the segment breadth. Legs up to nearly completely yellowish but usually coxa with dark basal half.

Male tergite structures. Posterior borders of T6 and T7 moderately (to weakly) concave, of T8 weakly concave, of T10 convex, broadly parabolic. Glandular pits of T7 (Figs 49G-I, 55D-F, 56D,G) open bowl-shaped, in outline semicircular, separated by a relatively broad median ridge with well-developed anterior process; posterior borders of pits almost straight; behind openings with a flat, poorly demarcated elevation. The pits of T7 vary considerably between the different regions. In the eastern forms (holotype) the anterior process is more slender (Figs 55E,F), the pits are anteriorly deepened below the borders to shallow pouches (Figs 56D,G). The specimens from Portugal show a broader anterior process and flatter pits without pouches (Figs 49 G-I, 55D). Pits of T8 shallow depressions (Figs 55G,H).

Male genitalia. Hook of left phallomere. Shaft straight, sclerotized trough along its apical ⅔ or ¾.

**Remarks**. The wide distribution of the species is accompanied by a considerable variation in the pit structure of T7 (s. above). The differences in pit structures are correlated with differences in the size

of the membranous glands: In the eastern forms the membrane glands of T5/6 are larger than those of T4/5 (Figs 56B,C); in specimens from Portugal the reverse is true (Figs 49E,F). The two populations are connected by a very broad transition zone with intermediate forms around the line connecting Santiago de Compostela and Salamanca. The differences in gland structure may justify the establishment of subspecies for the two populations, but the breadth of the transition zone makes me hesitate to do so at the moment.

**Geographical distribution** (Fig. 6). Widely distributed in the northern part of the Iberian peninsula, but – apart from one locality S of Santander – not occurring E and N of the Ebro. The distribution gap in Portugal between the Rivers Mondego and Douro is presumably an artifact: there are no collecting data from this region nor from the northern parts of the provinces La Coruña, Lugo, and Asturias. In the east of central Spain there is one very isolated occurrence in the Province Cuenca, near Tarascon. The reference is based on a single male labelled only with "Uclés" [MAKB]. Though there is obviously no other locality in Spain with this name I have some doubt whether the labelling is correct. At altitudes of 150-1500 m.

**Accompanying species, discrimination of females**. *P. globososacculata* (Sp 83, 84, 123, 131, 134, 154) and *P. septentrionalis* (Po 17, Sp 134, 153): interocular space reddish; *P. lativittata* (Po 18): pronotum disk with lateral extensions; *P. barbata* (Sp 123, 129, 131, 134, 424) and *P. tenuirostris* (Sp 164): coxa for most part dark; *P. carpetana* (Sp 329): narrower wings, coxa for most part dark; *P. bolivariana* (Sp 125, 127, 418): indistinguishable.

## Unidentified females from Spain

(Sp: author's collection, all others: MNHNM)

*P. moralesi* or *P. globososacculata*? Prov. Segovia: 1♀, La Granja, Arias. Prov. Madrid: 1♀, Madrid, I.Bolívar; 1♀, El Pardo, IV.[1]932, # 1560, E.Morales; 1♀, Escorial, Arias; 1♀, Cercedilla, Estación Alpina, 1500 m, IV.1930, J.Hernandez. Prov. Guadalajara: 1♀, Brihuega, VII.1900, L.Navas. Prov. Cuenca: 3♀♀, Tragacete, Julio 1906, Arias; 1♀, Cañada del Cubillo, Julio 1906, Arias; 2♀♀, Cañizares, Selgas.

*saccaraoi*-group: Prov. Granada: 3♀♀, Sp 262.

*P. barbata*? Prov. Logroño: 1♀, Sierra de la Demanda, Sn. Lorenzo, J.Carandell.

*P. acuminata* or *P. rhomboidea* ? Prov. Salamanca: 1♀, La Hoya, 1300 m, Presa 15 Q, 24.VII.[19]78, S.Fdez.Gayubo.

*P. carpetana* or *P. acarinata*? Prov. Salamanca: 1♀, Sp 174. Prov. Cáceres: 1♀, Sp 305. Prov. Avila: 1♀, Navarredonda, VI.1909, # 1566, Exp. del Museo; 2♀♀, Valle de Iruelas, V.1920, C.Bolivar. Prov. Segovía: 1♀, Balsain; 1♀, San Rafael, 1300 m, I.Bolívar; 1♀, San Rafael, 15.VI.1929, Escalera; 1 L, San Rafael, 5.V.1912, C.Bolívar. Prov. Madrid: 2♀♀, El Ventorillo, VII.[19]35, E.Mor.; 1♀, En el Hayelo de Monteja de la Sierra, 14.V.1965; 1♀, Monteja de la Sierra, C.Bolívar; 2♀♀, Pto. Navacerrada, VII.[19]35, E.Mor.; 1♀, Guadarrama, Pto. Navacerrada, 1700 m, VIII.[19]60, J.Abajo; 3♀♀, Sp 7.

*P. bolivariana* or *P. fernandesiana*? Prov. Oviedo: 1♀, Rondiella, P.N. Cavadonga, C.Bolívar; 2♀♀, Somiedo, Valle del Lago, 1565 m, 4-12.VIII.1949, Exp. Inst. Esp. Entomología. Prov. León: 3♀♀, Torrebarrio, 1212 m, 1.-10.VIII.1950, Exp. Inst. Esp. Entomología; 3♀♀, Torrebarrio, 4.-12.VIII.1949, Exp. Inst. Esp. Entomología; 3♀♀, Sp 152. Prov. Cantabria: 5♀♀, Picos Europa, VIII, # 1567, Bolívar. Prov. Palencia: 1♀, Sp 123.

*P. atlantica* or *P. fernandesiana*? Prov. La Coruña: 1♀, Villa Rutis, Bolívar.

*P. fernandesiana*? 1♀, Castro Loureiro [= Castro Laboreira, Sa. da Peneda, Portugal ?], A.Casares.

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## Tables

(Figs 7-57)

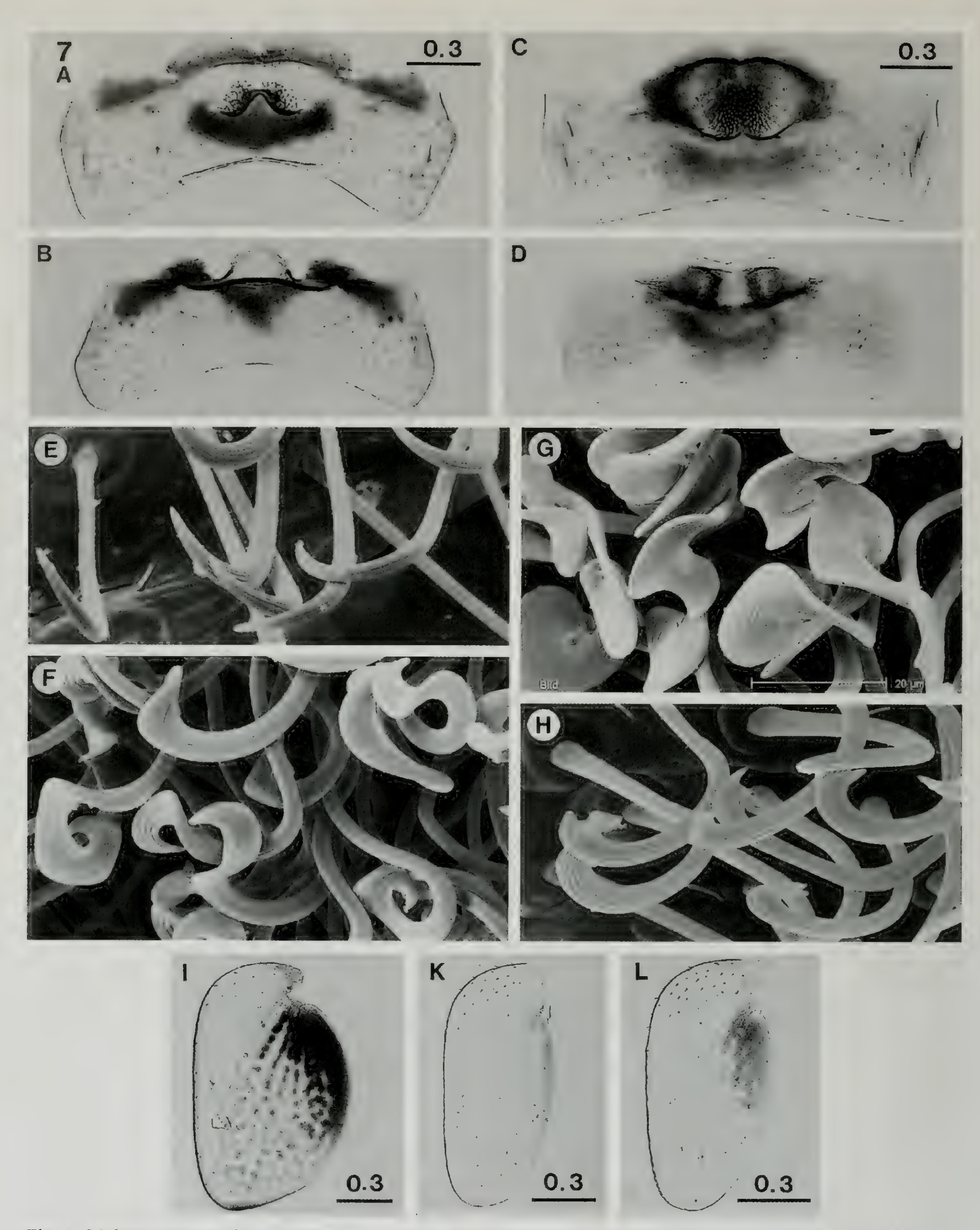



**Fig. 7.** Male structures of the *carpetana*-group and related groups. (A-D) Specializations on T7 (A,C) and T8 (B,D) in the *subaptera*- (A,B) and *nana*-group (C,D). (E-H) Bristles of the glandular pits of T7: Unspecialized bristles in *P. brevipennis* (E); specialized bristles with broadened tips in the *carpetana*- (F), the *subaptera*- (G), and the *nana*-group (H). (I-L) Forewings in the *carpetana*- (I), the *subaptera*- (K), and the *nana*-group (L). Identification: (A,B) Sp 330/4, (C,D) Sp 113/1, (E) Yu 34/2, (F) Sp 278/4 (*P. brevisacculata*), (G) Sp 203/4, (H), Sp 414/3, (I) Sp 461/5 (*P. javalambrensis*), (K) Sp 365/3, (L) Sp 374/2. Same scale (in mm) for (A,B), (C,D), and (E-H).

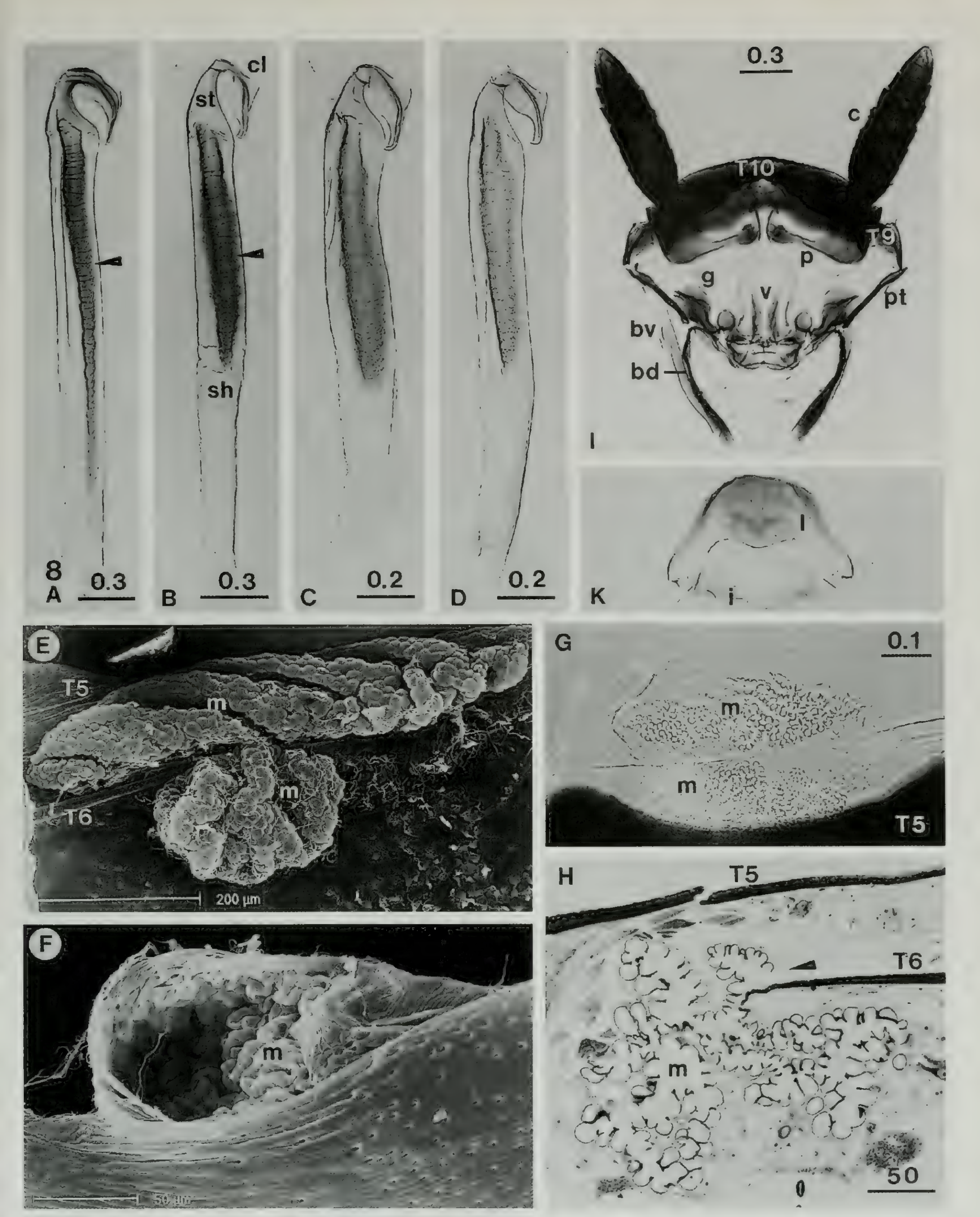



**Fig. 8.** (A-D) Hook of left phallomere with a long trough (arrows) in *Ectobius lucidus* (A) but a short trough in the *carpetana*- (B), the *subaptera*- (C), and the *nana*-group (D). (E-H) Membrane glands in the *carpetana*-group. SEM pictures: (E) Intersegmental region between T5 and T6 with two pouches, internal view, soft tissues removed by KOH; (F) membrane pouch at the left anterior border of T7 (detail of Fig. 15/E). (G) Phase contrast picture of the left anterior border of T5. (H) Histological sagittal section through the intersegmental region of T5/6 showing the alveolate structure of the membrane gland (arrow points to opening of the gland). (I,K) Female genital sclerites: (I) dorsal, (K) ventral complex. Identification: (A) It 48/3, (B) Sp 175a/2 *(P. acuminata)*, (C) Sp 330/4, (D) Sp 148/2, (E) Sp 269/9 *(P. sulcata)*, (F) Sp 123/9 *(P. barbata)*, (G) F 81/13 *(P. isolata)*, (H) Sp 99/8

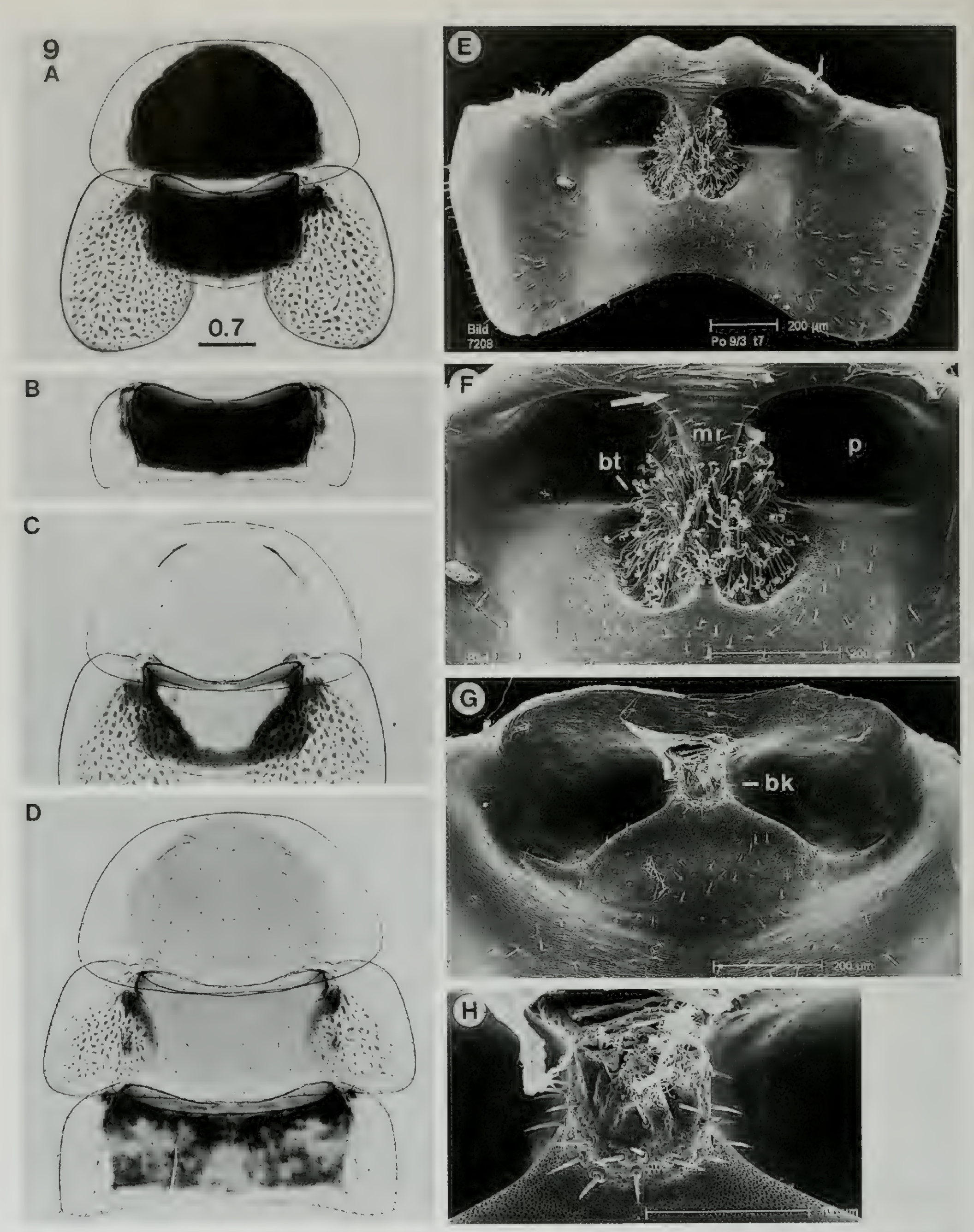



**Fig. 9.** *P. moralesi*, male (A-C, E-H), female (D). (A-D) Thoracal segments: (A,C) pron. and meson., (B) metan., (D) complete thorax. (E-H) SEM pictures: T7 (E; gland region: F, arrow points to cuticular folds), gland region of T8 (G; bristle knob: H). Identification: (A,B) Po 10/1, (C) Po 9/1, (D) Po 10/4, (E-H) Po 9/3. Same scale (in mm) for (A-D). – Abbreviations: (bk) bristle knob, (bt) bristle tuft, (mr) median ridge, (p) glandular pit.

◁ *(P. laticarinata)*, (I,K) Po 18/10,13 *(P. lativittata)*. Scale in (A-D,G,I,K) in mm, in (H) in µm; same scale for (I,K). – Abbreviations: (bd, bv) dorsal, ventral sclerite of basivalvula, (c) cercus, (cl) claw, (g) gonangulum, (i) intersternal fold, (l) laterosternite, (m) membrane gland, (pt) paratergites 8+9, (sh) shaft, (st) stalk, (v) valves.




**Fig. 10.** *P. moralesi*, male (B-N), female (A,O,P). T5 (A,B), T6 (C), T7 (D; gland region: H,I), T8 (E; gland region: G), T9+10 (F), hook of left phallomere (K,L), subgenital plate (M), forewings (N-P). Identification: (A) Po 10/4, (B-F,M) Po 10/1, (G,I) Sp 290/1, (H) Po 9/1, (K,L) Po 8/1, (N) Sp 11a/6, (O) Po 8/10, (P) Po 8/9. Same scale (in mm) for (A,N-P), (B-F,M), and (G-K).

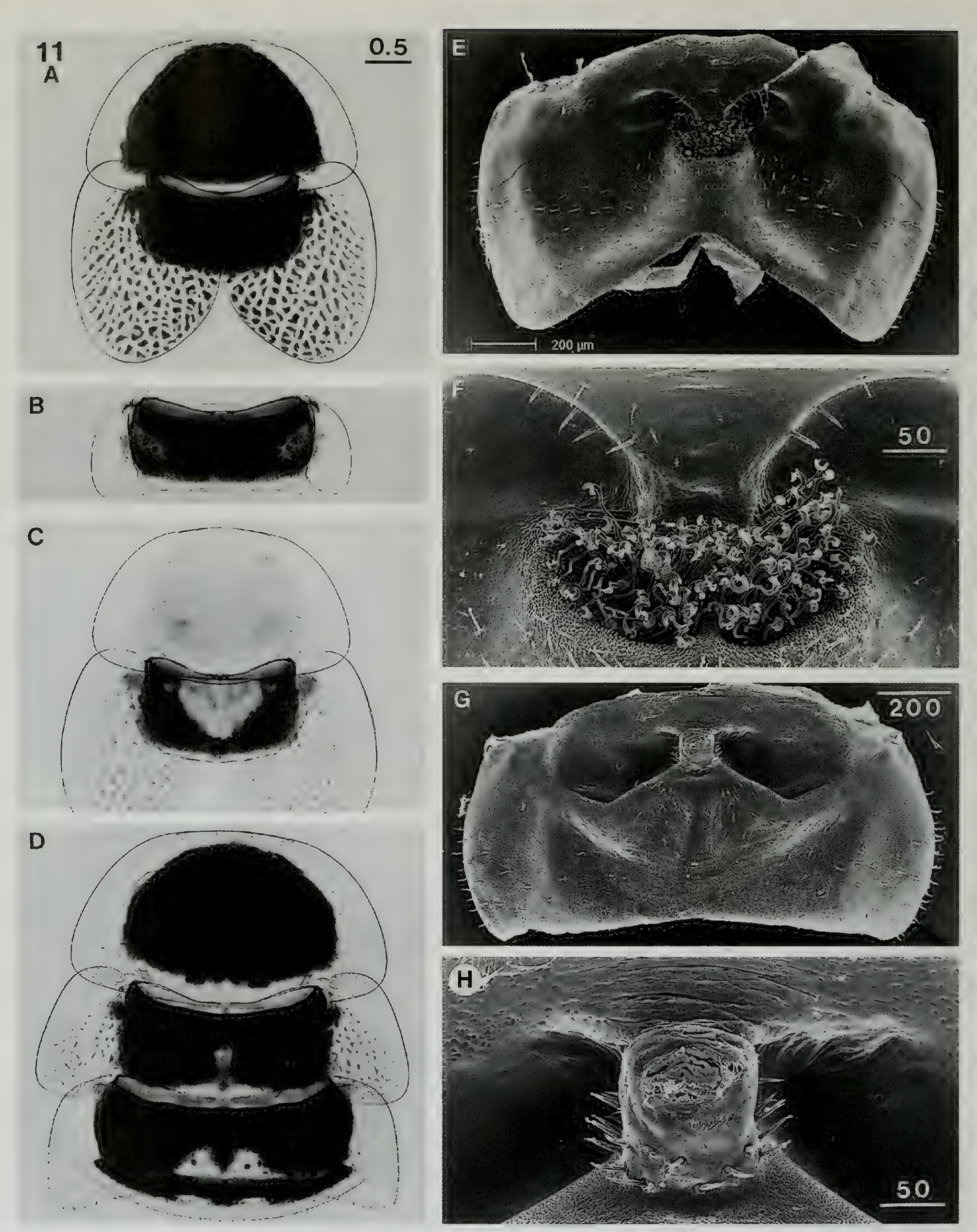



**Fig. 11.** *P. septentrionalis*, male (A-C,E-H), female (D). (A-D) Thoracal segments: (A,C) pron. and meson., (B) metan., (D) complete thorax (and first abdominal segment). (E-H) SEM pictures: T7 (E; ridge and bristle tuft: F), T8 (G; median ridge and bristle knob: H). Identification: (A,B) Po 13/1, (C) Po 15/2, (D) Po 26/5, (E,F) Po 14/4, (G,H) Po 14/3. Scale in mm in (A), in µm in (F-H); same scale for (A-D).

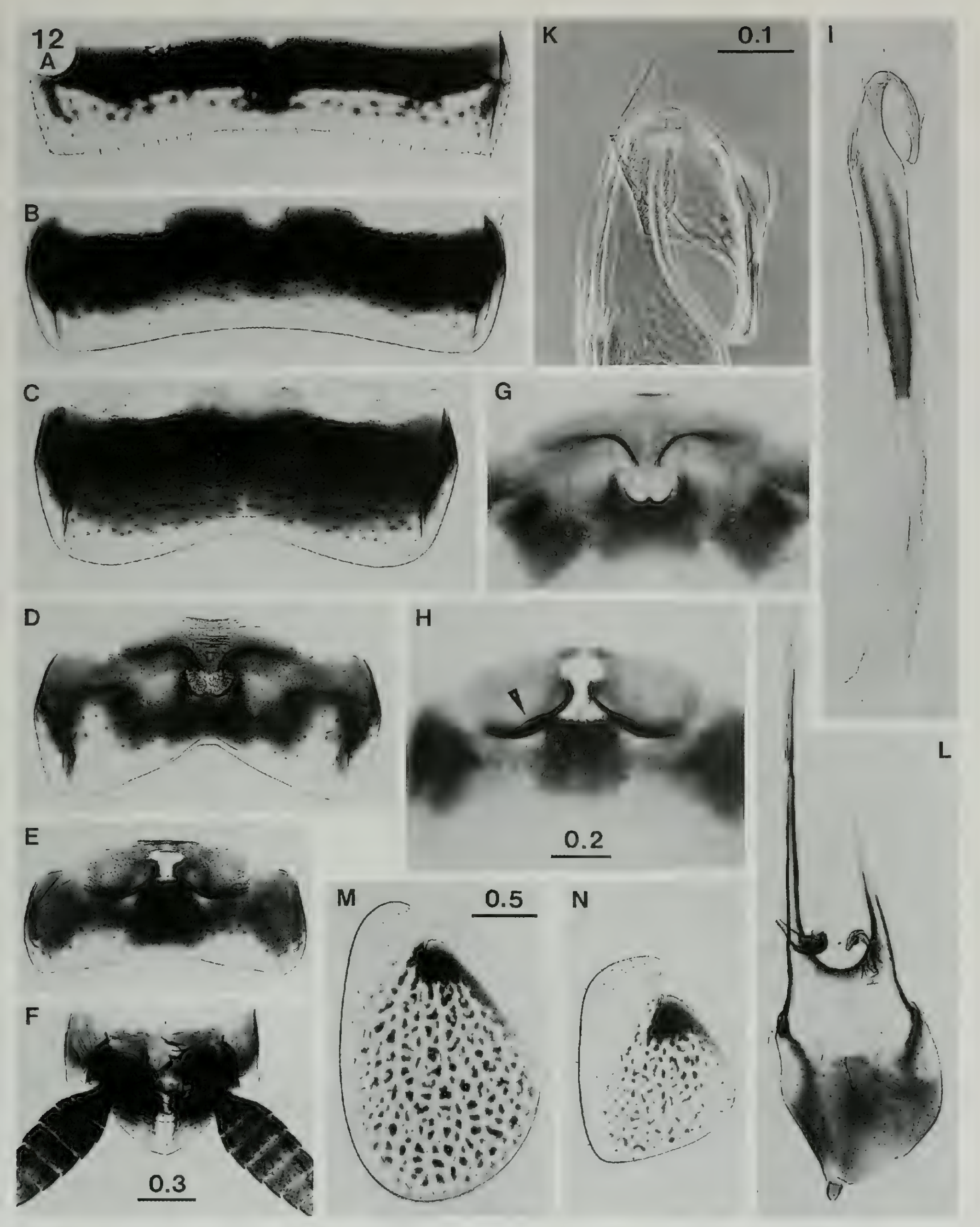



**Fig. 12.** *P. septentrionalis*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D; gland region: G), T8 (E; gland region: H, arrow points to shallow pouch), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Same scale (in mm) for (A,M,N), (B-F,L), and (G,H,I). Identification: (A) Po 13/7, (B-F,I-M) Po 13/3 (Holotype), (G,H) Sp 227/3, (N) Po 13/8.

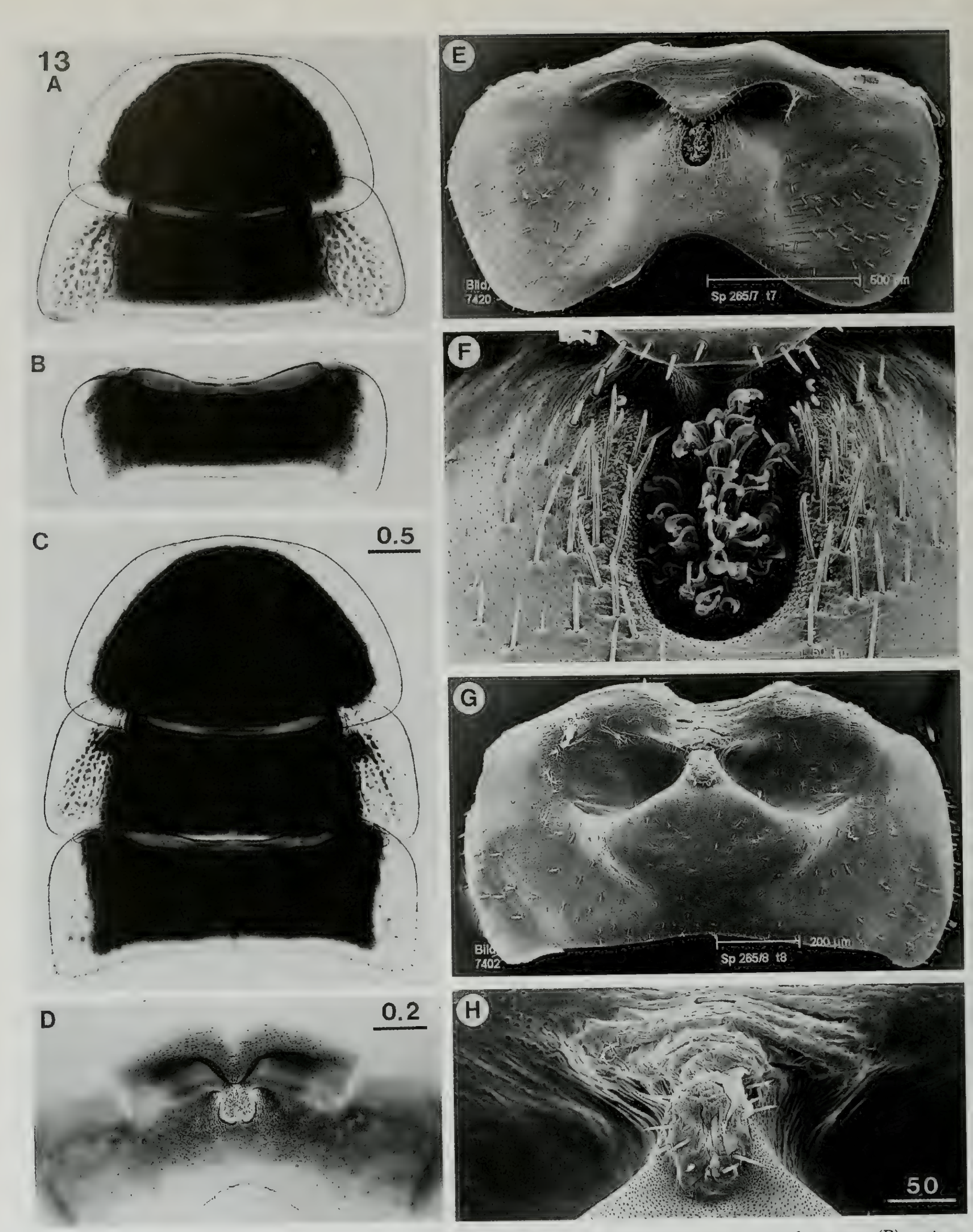



**Fig. 13.** *P. delospuertos*, male (A,B,D-H), female (C). (A-C) Thoracal segments: (A) pron. and meson., (B) metan., (C) complete thorax. (D) gland region of T7. (E-H) SEM pictures: T7 (E; bristle tuft: F), T8 (G; median ridge and bristle knob: H). Identification: (A,B) Sp 265/1 (Holotype), (C) Sp 265/10, (D) Sp 266/2, (E,F,H) Sp 265/7, (G) Sp 265/8. Scale in (C,D) in mm, in (H) in µm; same scale for (A-C).

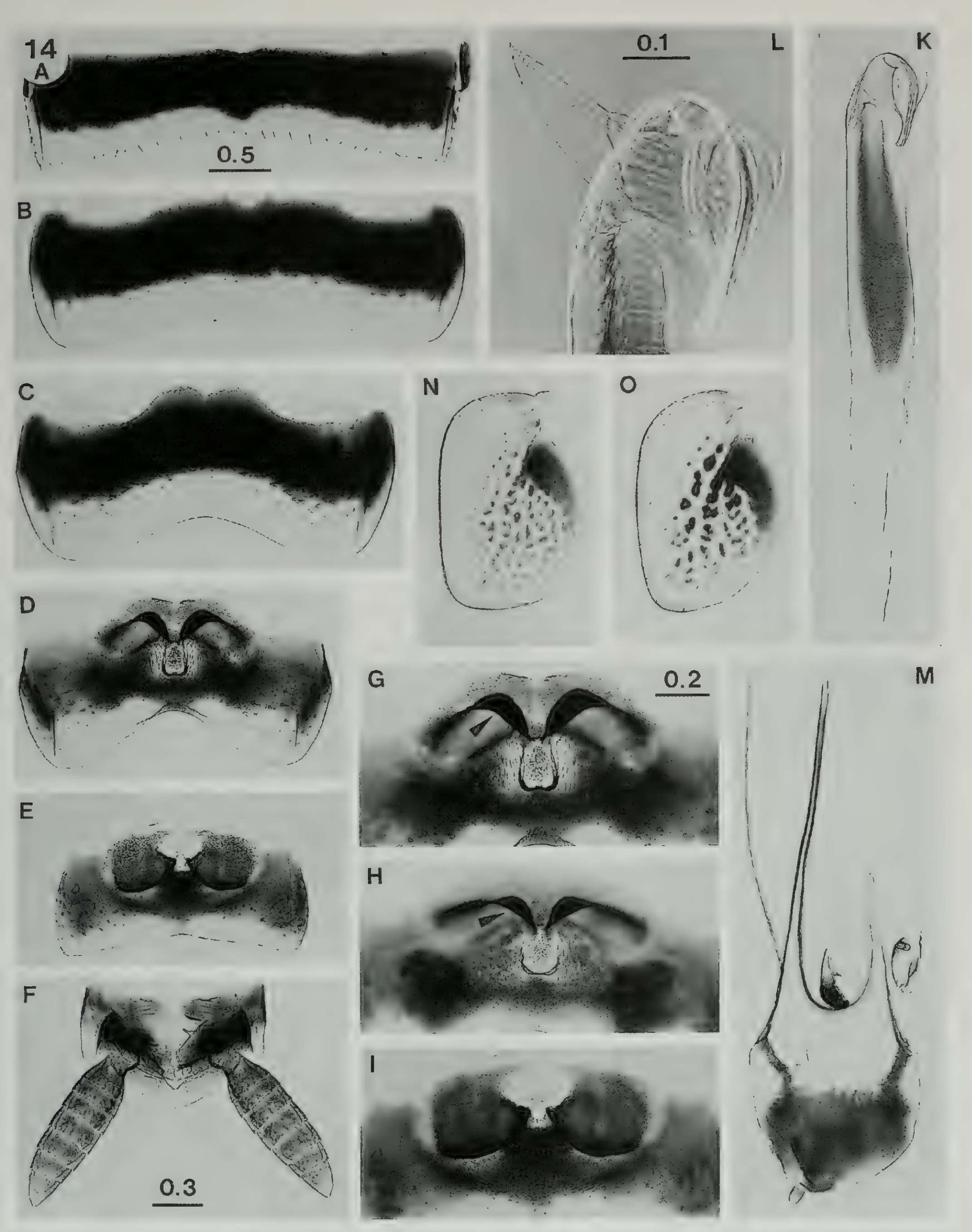



**Fig. 14.** *P. delospuertos*, male (B-N), female (A,O). T5 (A,B), T6 (C), T7 (D; gland region: G,H, arrows point to shallow pouches), T8 (E; gland region: I), T9+10 (F), hook of left phallomere (K,L), subgenital plate (M), forewings (N,O). Identification: (A) Sp 265/10, (B-G,I-M) Sp 265/1 (Holotype), (H) Sp 266/1, (N) Sp 266/3, (O) Sp 265/11. Same scale (in mm) for (B-F,M-O) and (G-K).

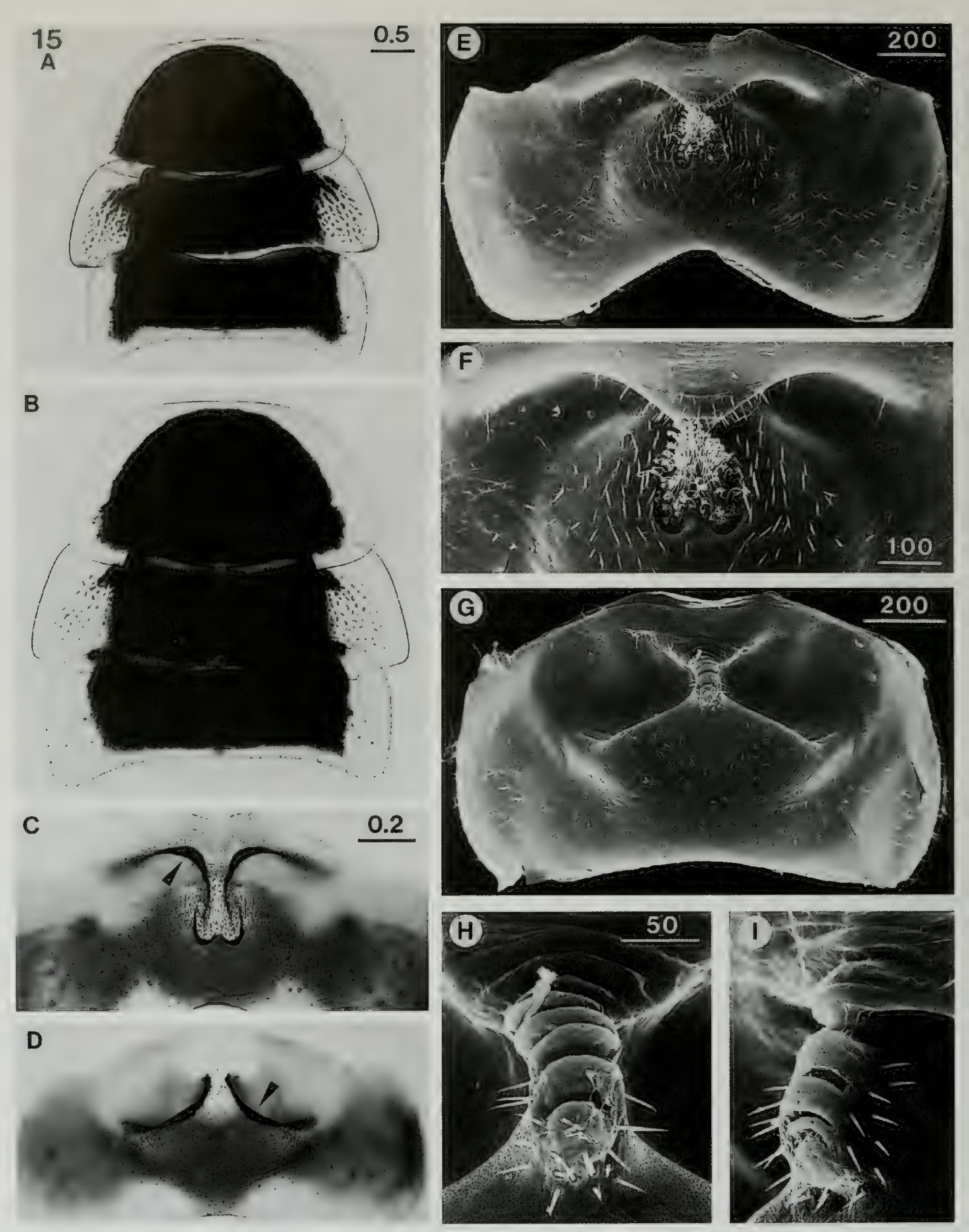



**Fig. 15.** *P. isolata*, male (A,C-I), female (B). (A,B) Thoracal segments. (C,D) Gland region of T7 (C) and T8 (D), arrows point to shallow pouches. (E-I) SEM pictures: T7 (E; gland region: F), T8 (G; median ridge and bristle knob: H,I, the latter in dorsolateral view). Identification: (A) F 81/12, (B) F 81/10, (C,D) F 43a/1, (E,F,I) F 81/3, (G,H) F 81/4. Scale in (A,C) in mm, in (E-H) in µm; same scale for (A,B) and (H,I).

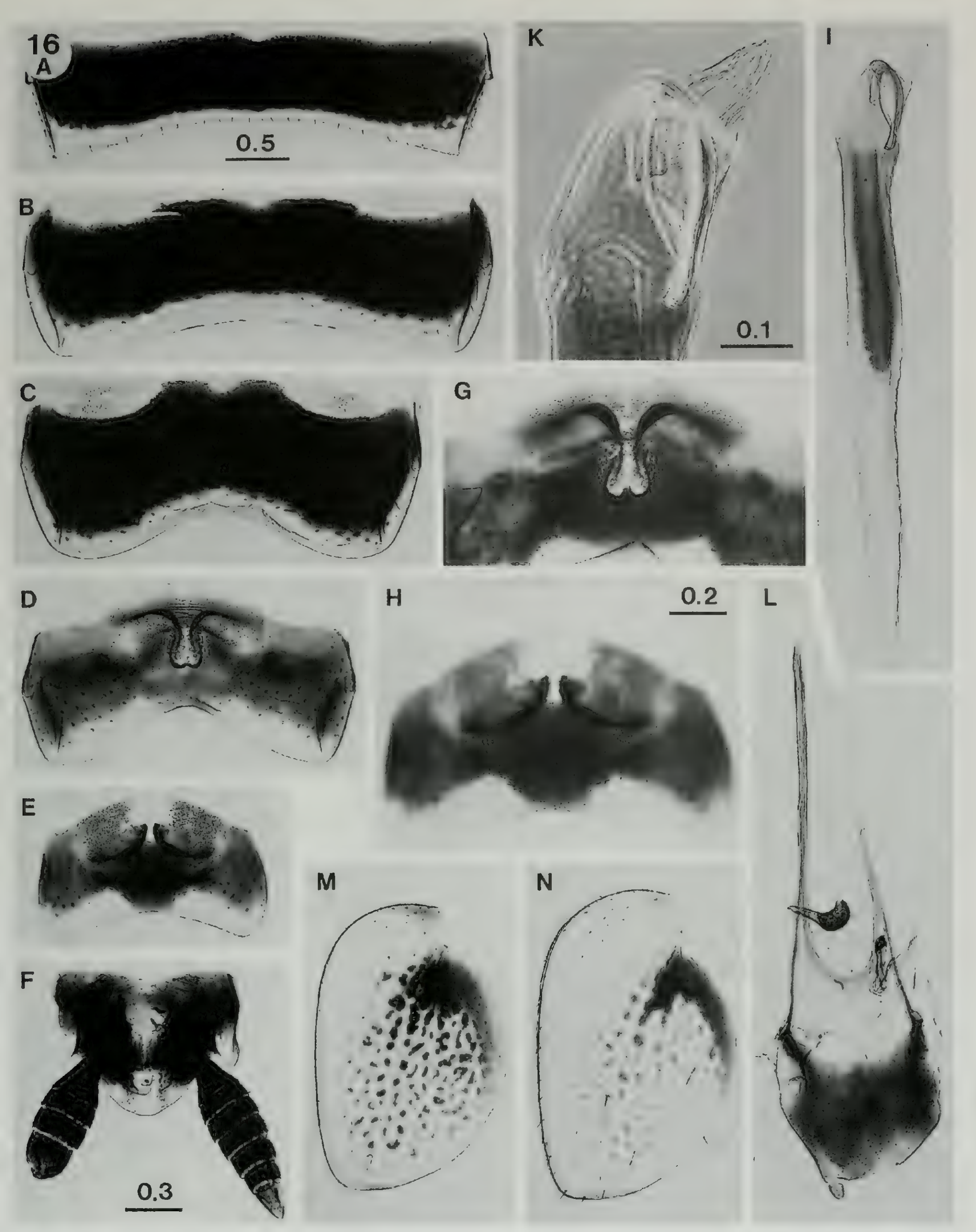



**Fig. 16.** *P. isolata*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D; gland region: G), T8 (E,H), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A,N) F81/10, (B,C,E-L) F 81/2 (Holotype), (D,M) F 81/13. Same scale (in mm) for (B-F,L-N) and (G-I).

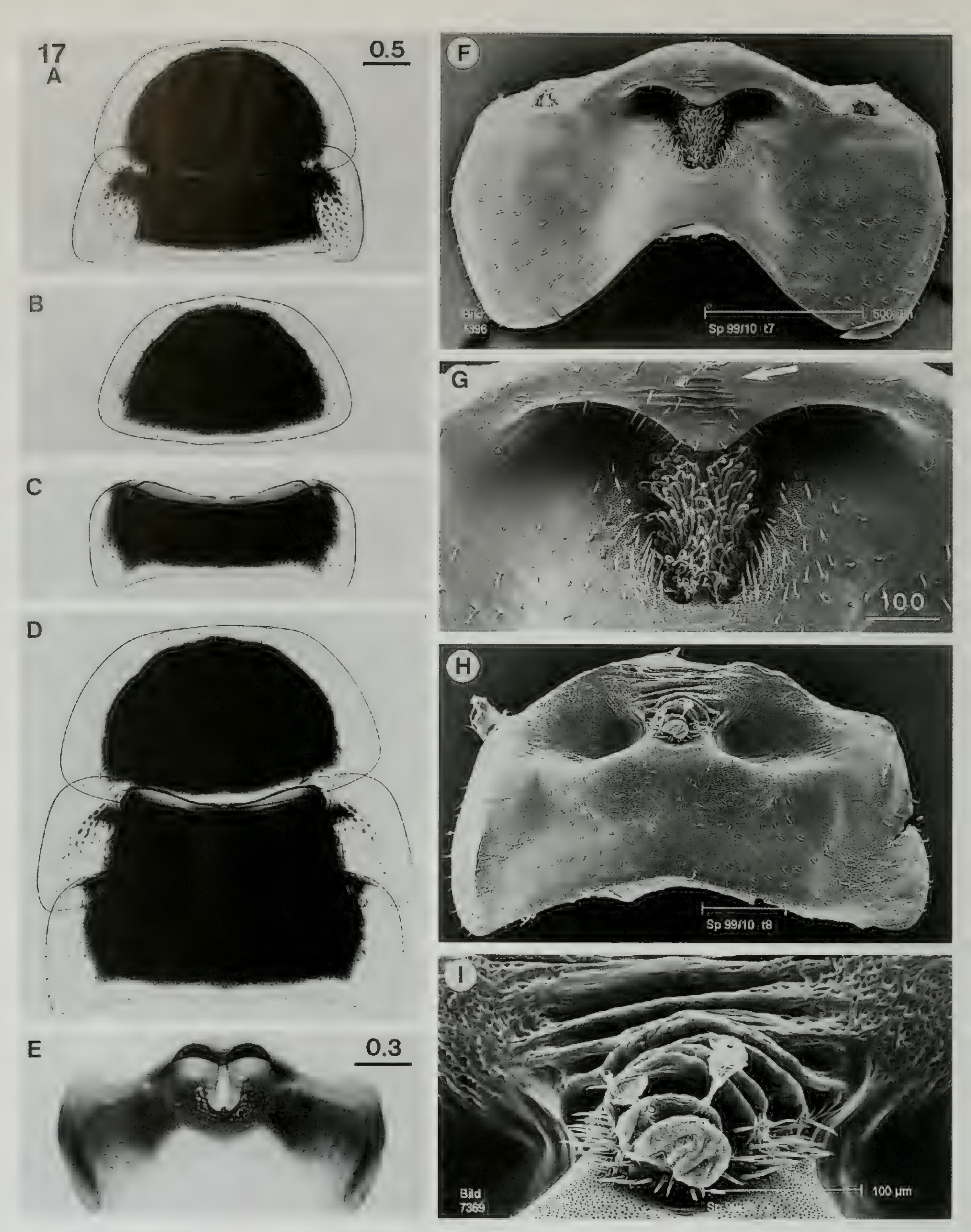



**Fig. 17.** *P. laticarinata*, male (A-C,E-I), female (D). (A-D) Thoracal segments: (A) pron. and meson., (B) pron., (C) metan., (D) complete thorax. (E) T7. (F-I) SEM pictures: T7 (F; gland region: G, arrow points to transversal slits and ridges), T8 (H; median ridge with bristle knob: I). Identification: (A) Sp 99/9, (B, C) Sp 99/5 (Holotype), (D) Sp 99/13, (E) Sp 99/3, (F-I) Sp 99/10. Scale in (A,E) in mm, in (G) in µm; same scale for (A-D).

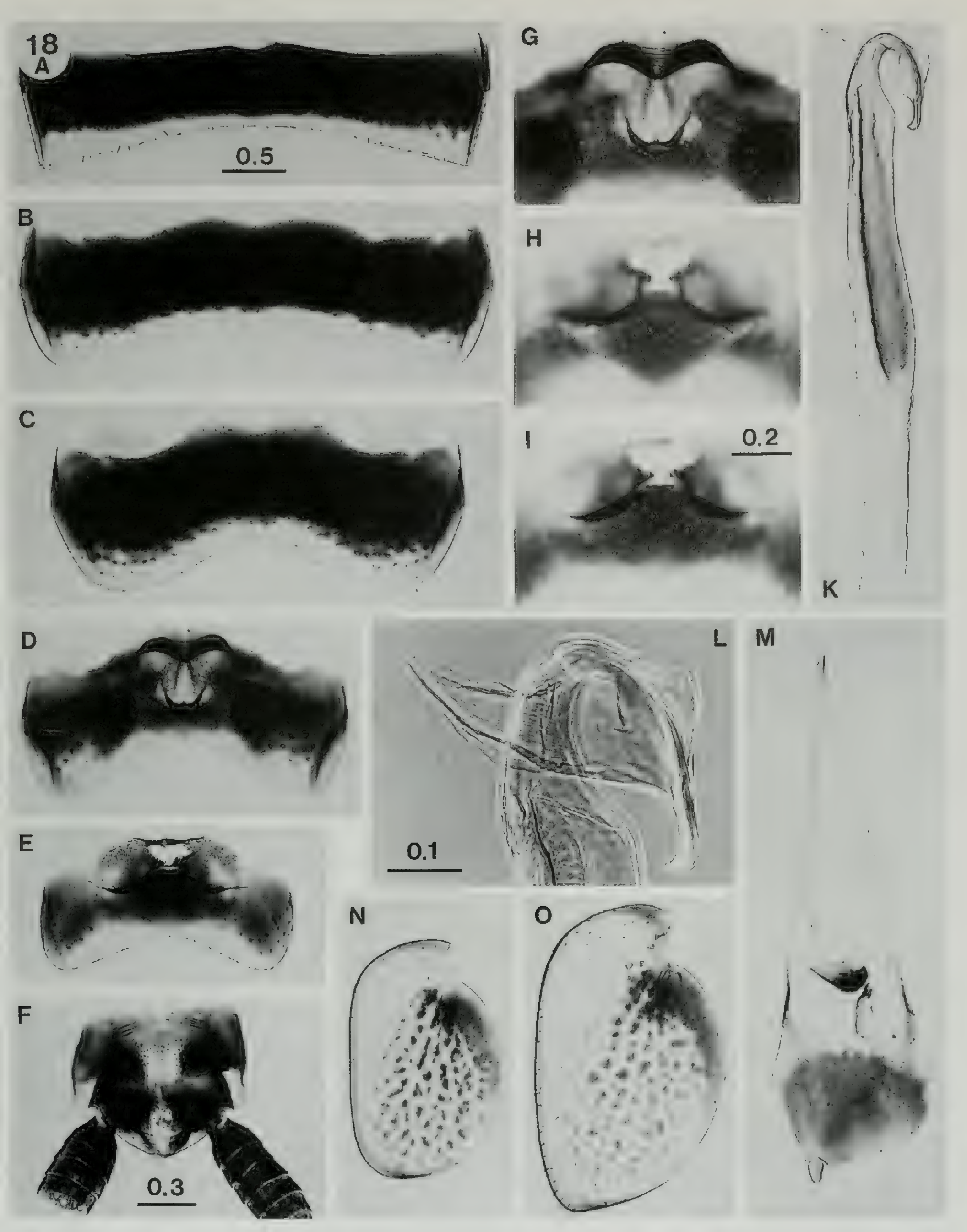



**Fig. 18.** *P. laticarinata*, male (B-N), female (A,O). T5 (A,B), T6 (C), T7 (D; gland region: G), T8 (E, gland region: H,I), T9+10 (F), hook of left phallomere (K,L), subgenital plate (M), forewings (N,O). Identification: (A) Sp 99/13, (B-G,I-N) Sp 99/5 (Holotype), (H) Sp 99/3, (O) Sp 99/11. Same scale (in mm) for (B-F,M-O) and (G-K).

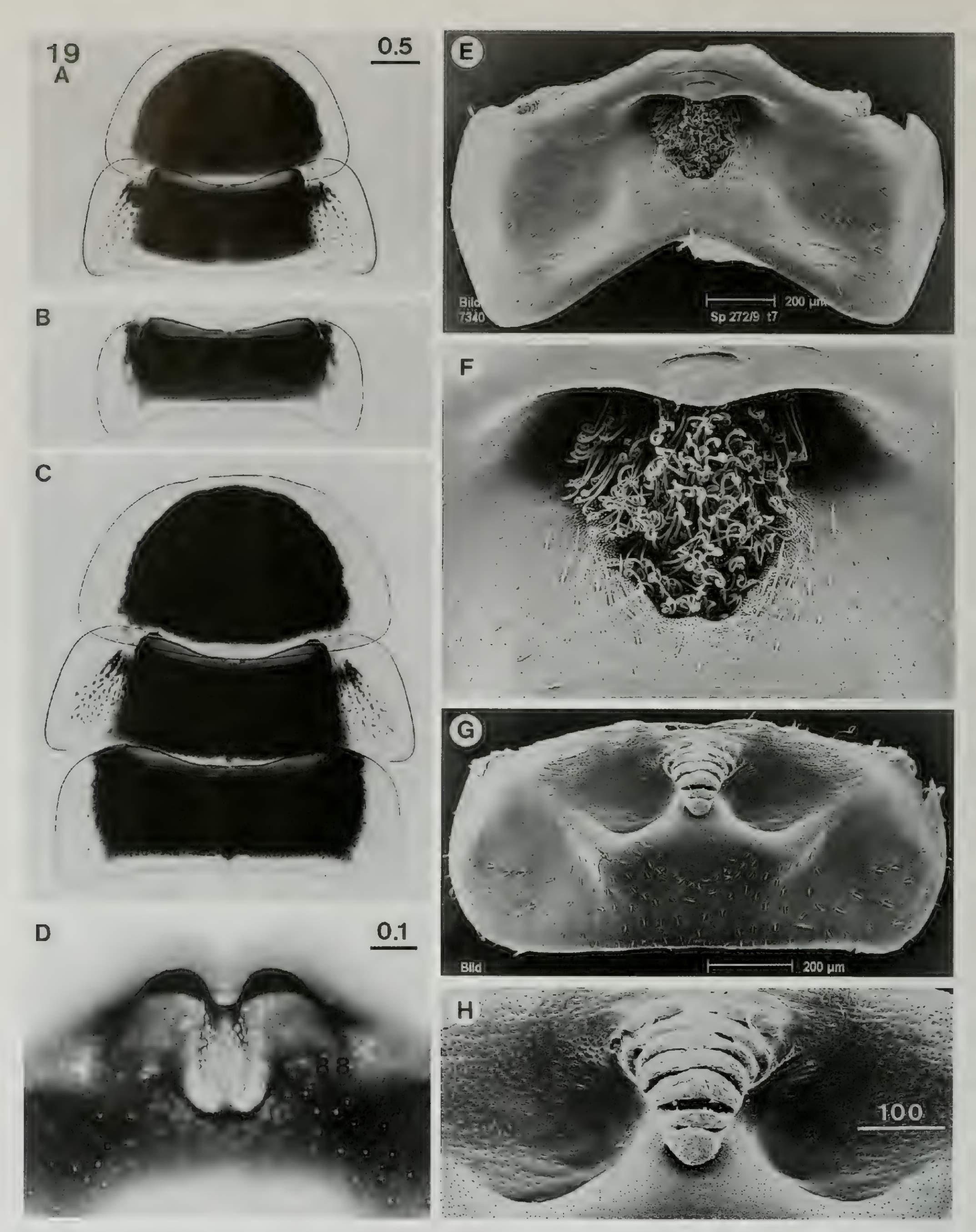



**Fig. 19.** *P. javalambrensis*, male (A,B,D-H), female (C). (A-C) Thoracal segments: (A) pron. and meson., (B) metan., (C) complete thorax. (D) gland region of T7. (E-H) SEM pictures : T7 (E; gland region: F), T8 (G; gland region: H). Identification: (A,B) Sp 272/4 (Holotype), (C) Sp 461/2, (D) Sp 272/3, (E-H) Sp 272/9. Scale in (A,D) in mm, in (H) in µm; same scale for (A-C).

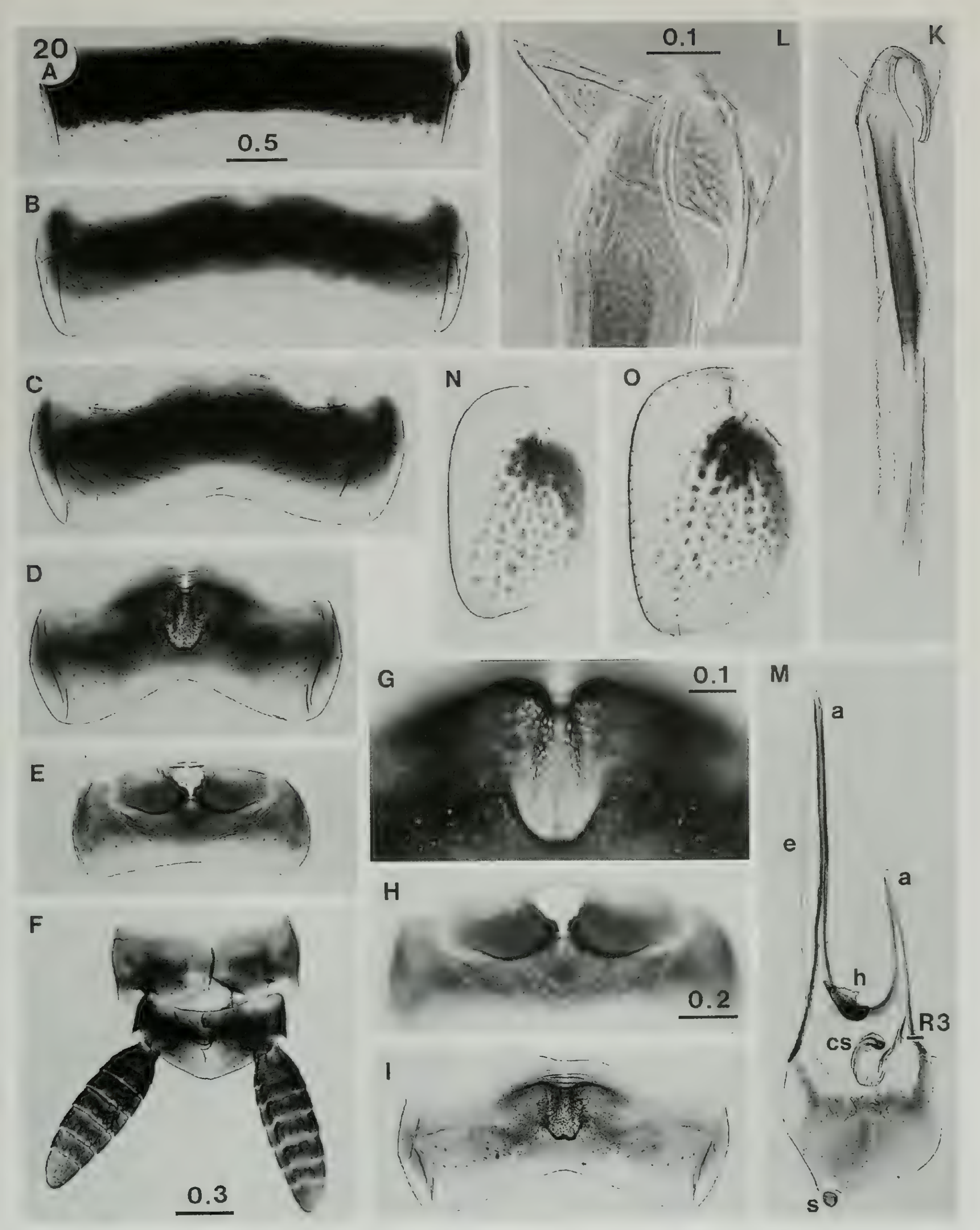



**Fig. 20.** *P. javalambrensis*, male (B-N), female (A,O). T5 (A,B), T6 (C), T7 (D,I; gland region: G), T8 (E,H), T9+10 (F), hook of left phallomere (K,L), subgenital plate (M), forewings (N,O). Identification: (A) Sp 461/2, (B-H,K-M) Sp 272/4 (Holotype), (I) Sp 272/5, (N) Sp 272/9, (O) Sp 461/4. Same scale (in mm) for (B-F,I,M-O) and (H,K). – Abbreviations: (a) apodemes of the subgenital plate, (cs) cleft sclerite, (e) endophallic apodeme, (h) helmet sclerite, (R3) R3 sclerite, (s) stylus.

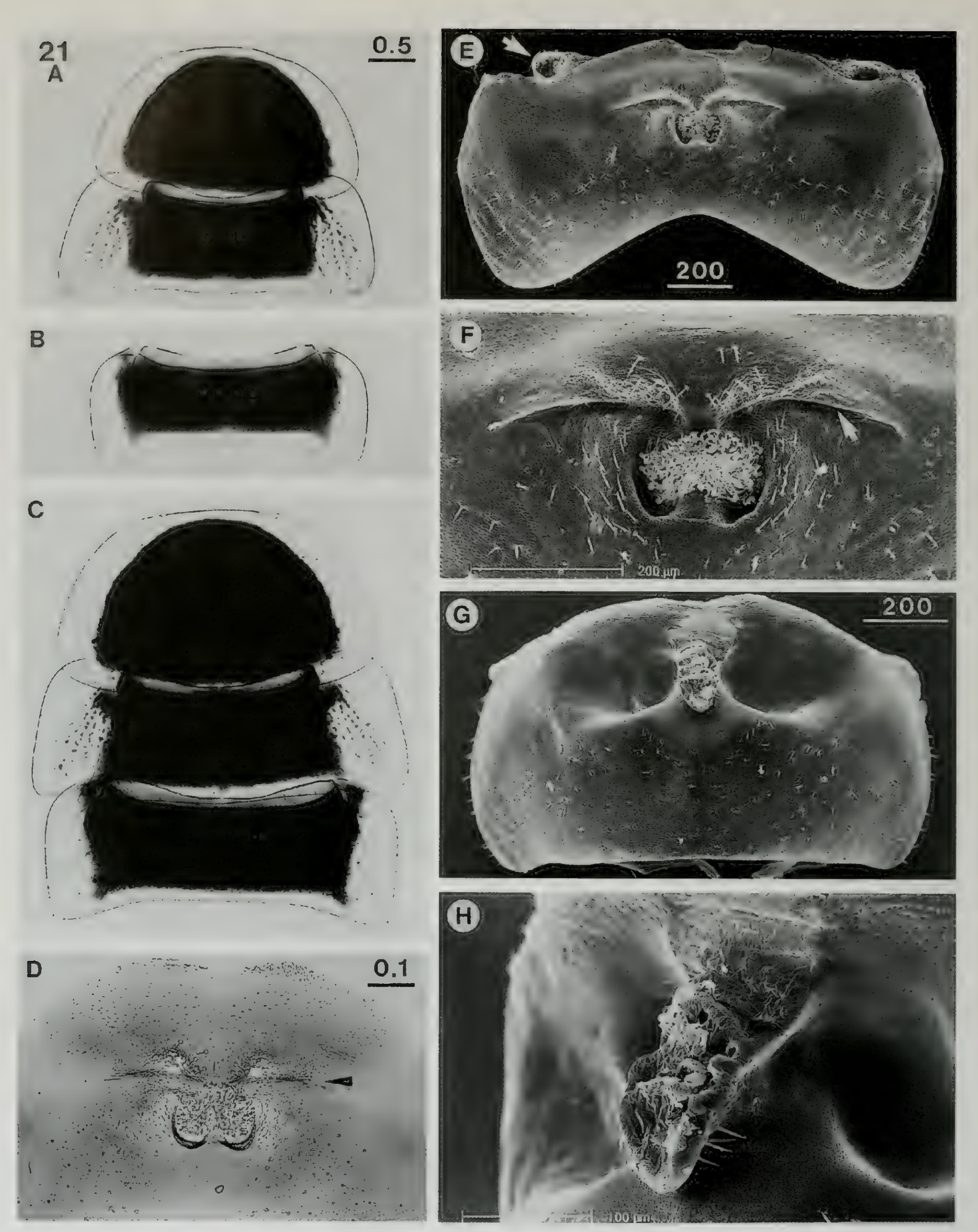



**Fig. 21.** *P. sulcata*, male (A,B,D-H), female (C). (A-C) Thoracal segments: (A) pron. and meson., (B) metan., (C) complete thorax. (D) gland region of T7 (bleached, arrow points to transversal furrow). (E-H) SEM pictures: T7 (E, arrow points to membrane pouch; gland region: F, arrow points to transversal furrow), T8 (G; median ridge and bristle knob, in dorsolateral view: H). Identification: (A,B) Sp 268/1 (Holotype), (C) Sp 268/7, (D) Sp 269a/1, (E) Sp 269/9, (F-H) Sp 269/8. Scale in (A,D) in mm, in (E,G) in µm; same scale for (A-C).

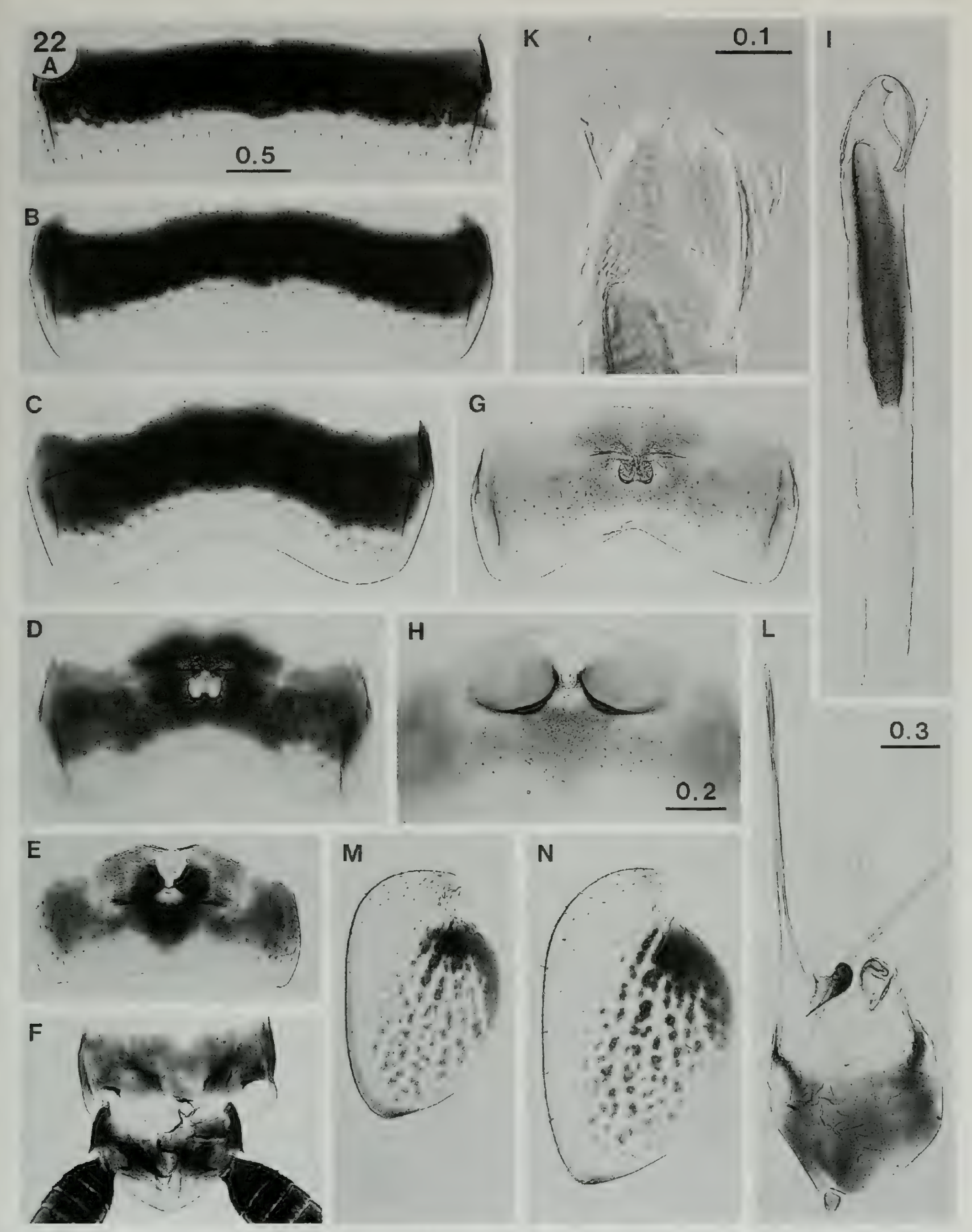



**Fig. 22.** *P. sulcata*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D,G, the latter bleached), T8 (E; gland region, bleached: H), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A) Sp 268/7, (B-F,L) Sp 268/1 (Holotype), (G) Sp 269a/1, (H) Sp 269a/2, (I,K) Sp 268/2, (M) Sp 269/4, (N) Sp 268/8. Same scale (in mm) for (B-G,L-N) and (H,I).

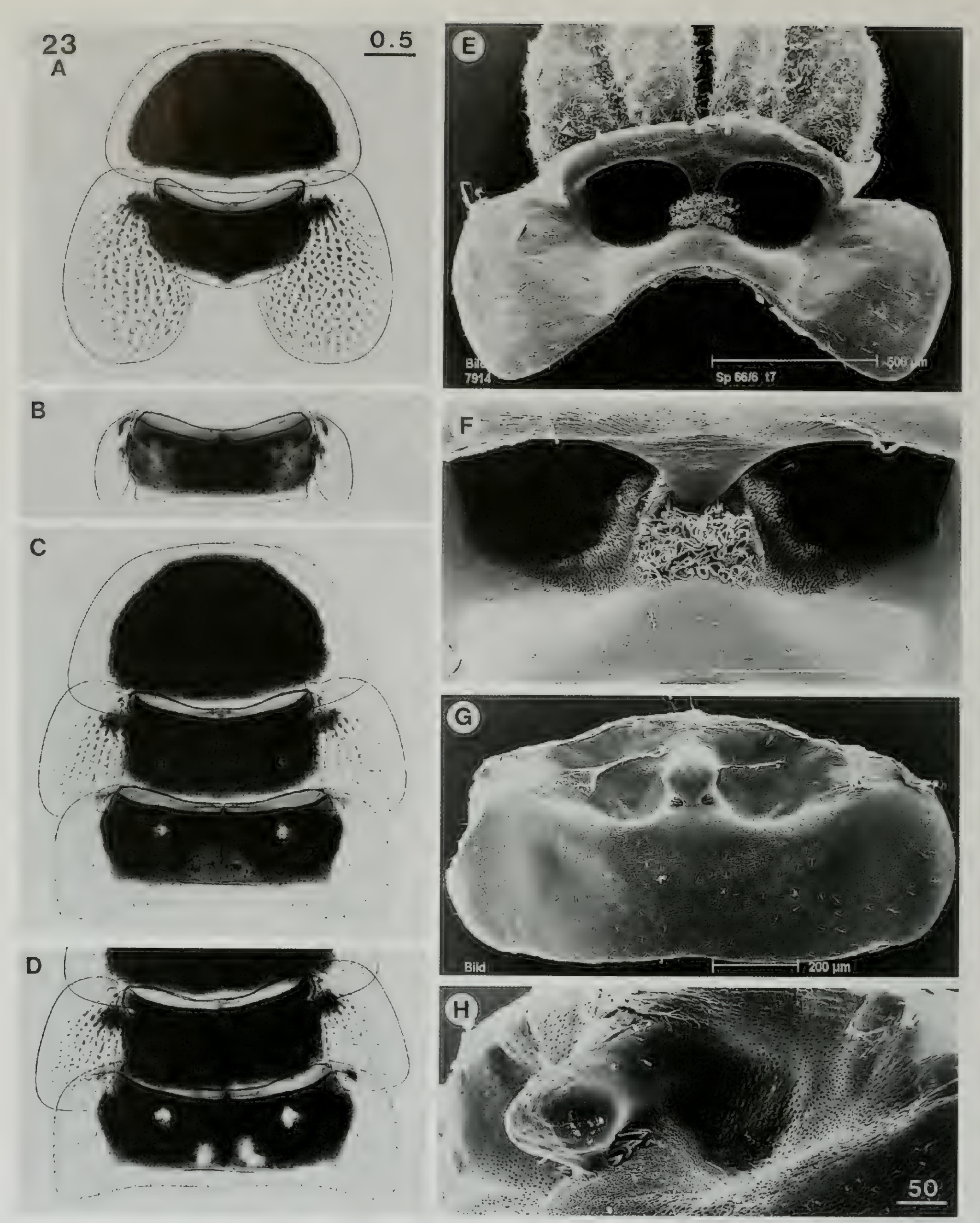



**Fig. 23.** *P. clavisacculata*, male (A,B,E-H), female (C,D). (A-D) Thoracal segments: (A) pron. and meson., (B) metan., (C,D) complete or nearly complete thorax. (E-H) SEM pictures: T7 (E; gland openings: F), T8 (G; median ridge and bristle knob, in dorsolateral view: H). Identification: (A,B) Sp 66/5 (Holotype), (C) Sp 66/7, (D) Sp 66/8, (E,H) Sp 66/6, (F,G) Sp 67/6. Scale in (A) in mm, in (H) in µm; same scale for (A-D).




**Fig. 24.** *P. clavisacculata*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D; gland region: G), T8 (E; gland region: H), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L, white arrows indicate length of apical sclerotization, black arrows the remaining part of the subgenital plate), forewings (M,N). Identification: (A) Sp 66/7, (B-L) Sp 66/5 (Holotype), (M) Sp 66/4, (N) Sp 66/9. Same scale (in mm) for (A,M,N), (B-F,L), and (G-I).

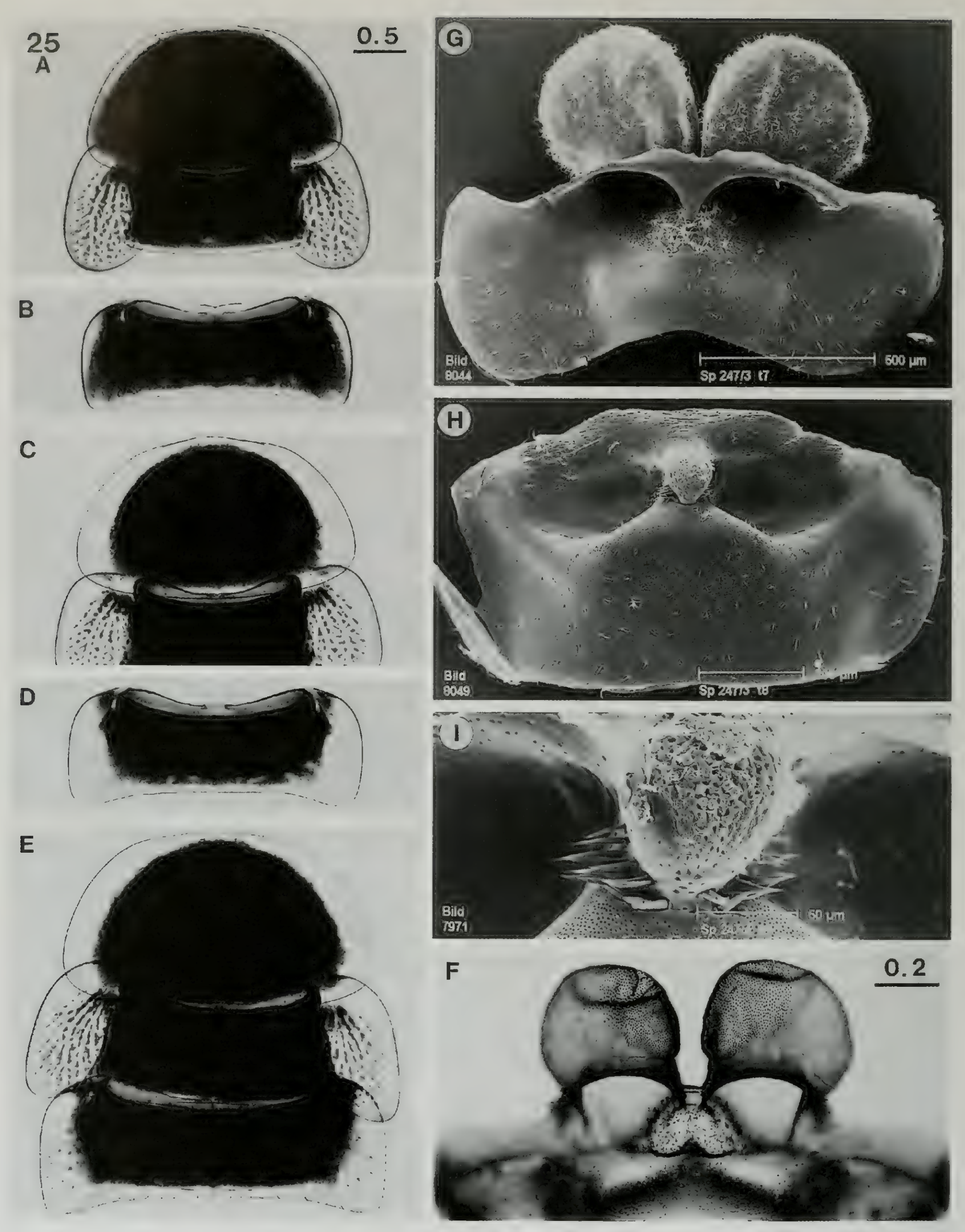



**Fig. 25.** *P. tenebricosa*, male (A-D,F-I), female (E). (A-E) Thoracal segments: (A,C) pron. and meson., (B,D) metan., (E) complete thorax. (F) gland region of T7. (G-I) SEM pictures: T7 (G), T8 (H; bristle knob: I). Identification: (A,B) Sp 247/2 (Holotype), (C,D) Sp 242/3, (E) Sp 247/5, (G-I) Sp 247/3, (F) Sp 246/3. Same scale (in mm) for (A-E).

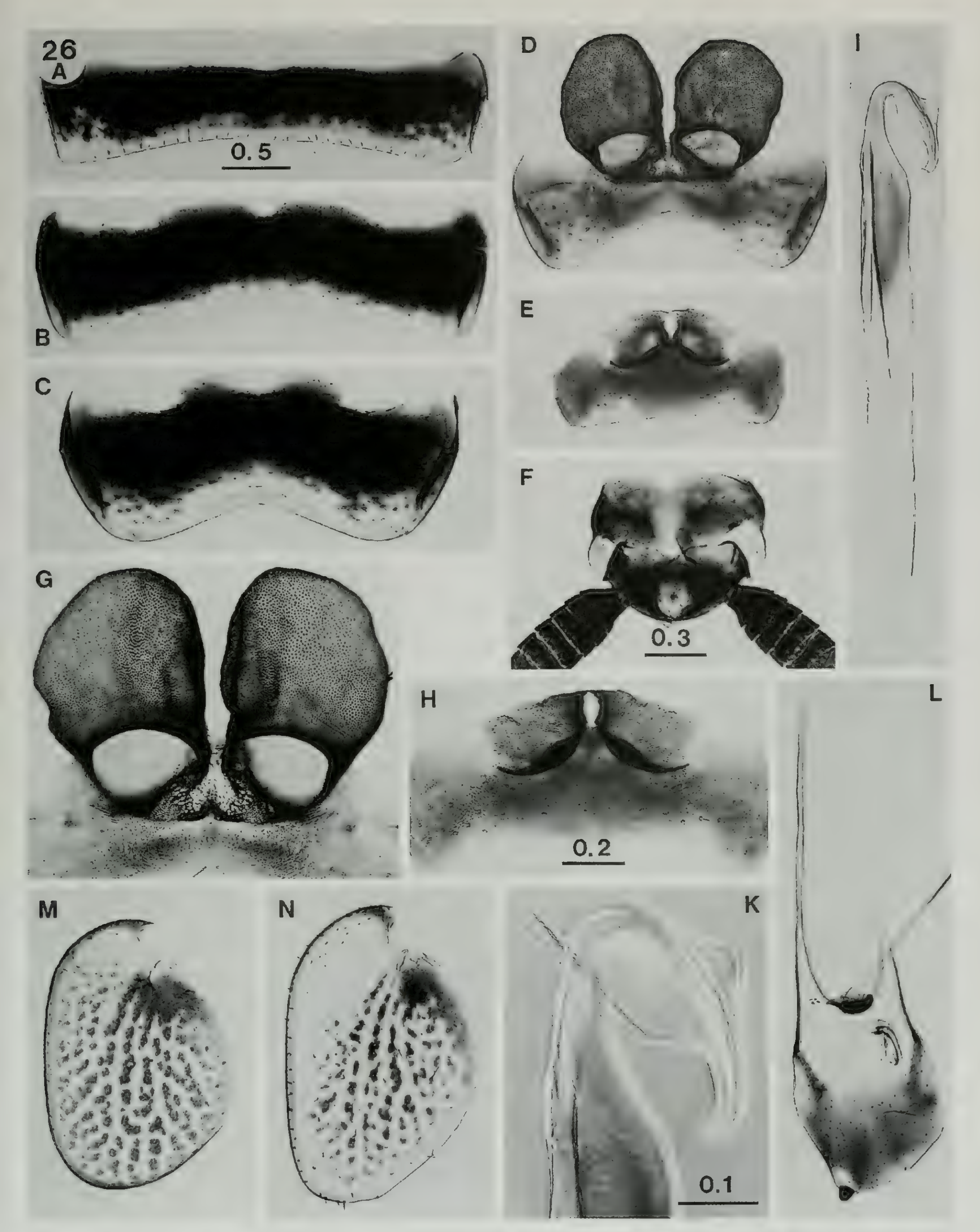



**Fig. 26.** *P. tenebricosa*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D; gland region: G), T8 (E; gland region: H), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A,N) Sp 247/6, (B-E,I-L) Sp 247/2 (Holotype), (F) Sp 254/1, (G,H) Sp 242/3, (M) Sp 33a/2. Same scale (in mm) for (B-F,L-N) and (G-I).

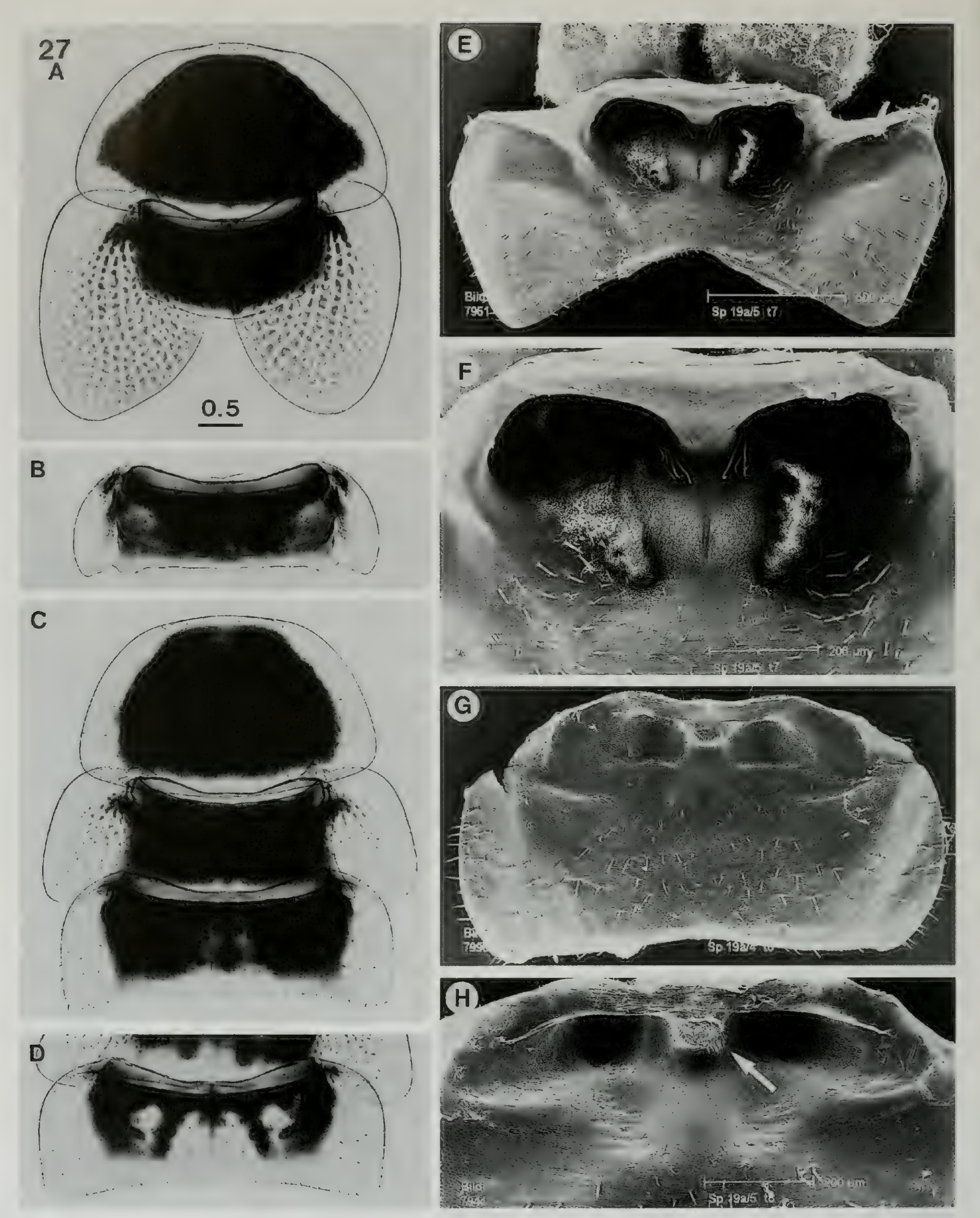



**Fig. 27.** *P. sacarraoi*, male (A,B,E-H), female (C,D). (A-D) Thoracal segments: (A) pron. and meson., (B,D) metan., (C) complete thorax. (E-H) SEM pictures: T7 (E; gland openings: F), T8 (G; gland region: H, arrow points to bristle knob). Identification: (A,B) Sp 74/6, (C) Sp 19/8, (D) Sp 19/9, (E,F,H) Sp 19a/5, (G) Sp 19a/4. Same scale (in mm) for (A-D).

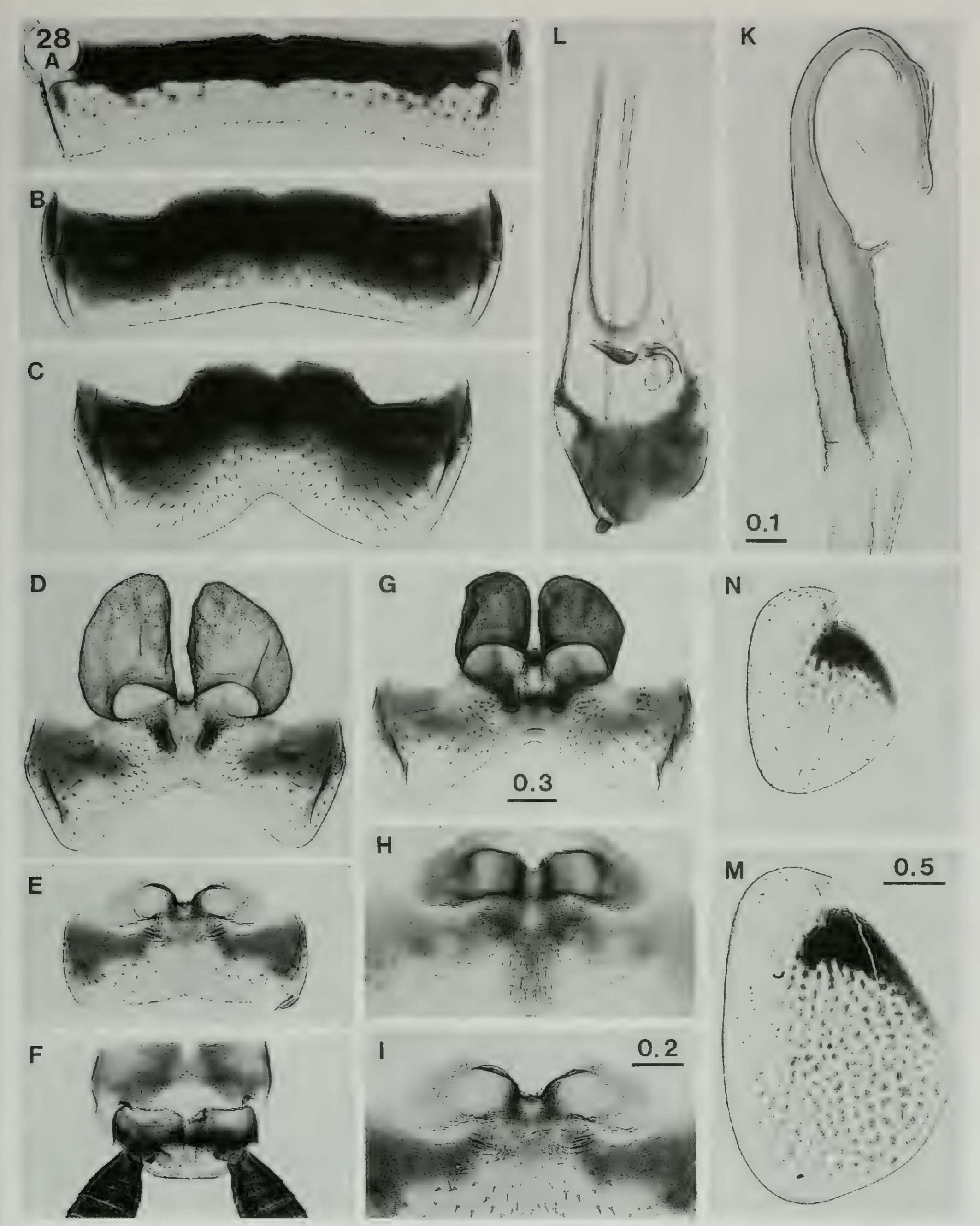



**Fig. 28.** *P. sacarraoi*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D,G), T8 (E; gland region: H,I), T9+10 (F), hook of left phallomere (K), subgenital plate (L), forewings (M,N). Identification: (A) Sp 19/9, (B-F,I,K) Sp 74/6, (G) Sp 285/1, (H) Sp 19a/3, (L) Sp 18a/3, (M) Type, (N) Sp 19/10. Same scale (in mm) for (A,M,N), (B-G,L), and (H,K).

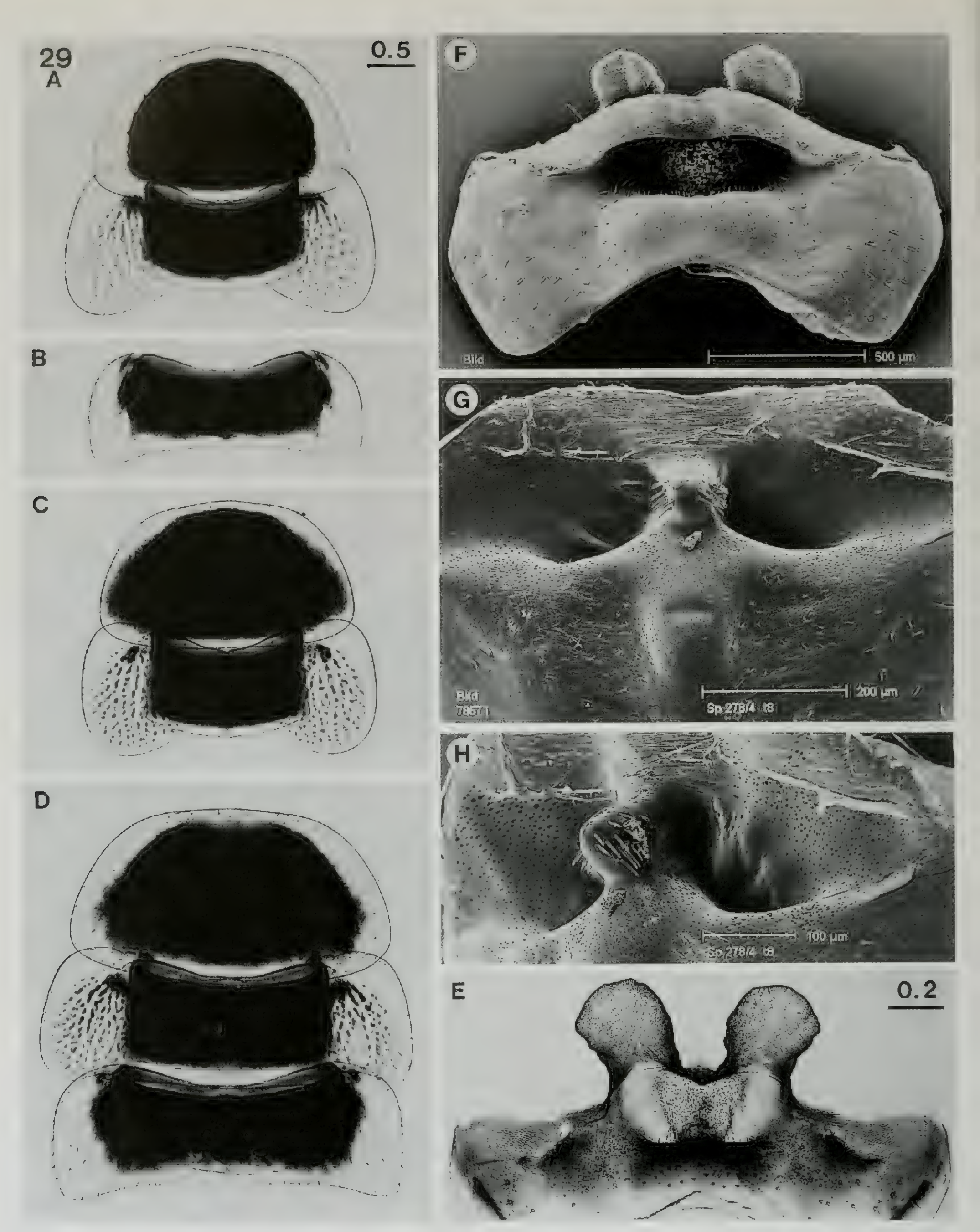



**Fig. 29.** *P. brevisacculata*, male (A-C,E-H), female (D). (A-D) Thoracal segments: (A,C) pron. and meson., (B) metan., (D) complete thorax. (E) T7. (F-H) SEM pictures: T7 (F), T8 (G,H: gland region, the latter in dorsolateral view). Identification: (A,B) Sp 260/8 (Holotype), (C) Sp 279/1, (D) Sp 260/12, (E) Sp 202/1, (F-H) Sp 278/4. Same scale (in mm) for (A-D).

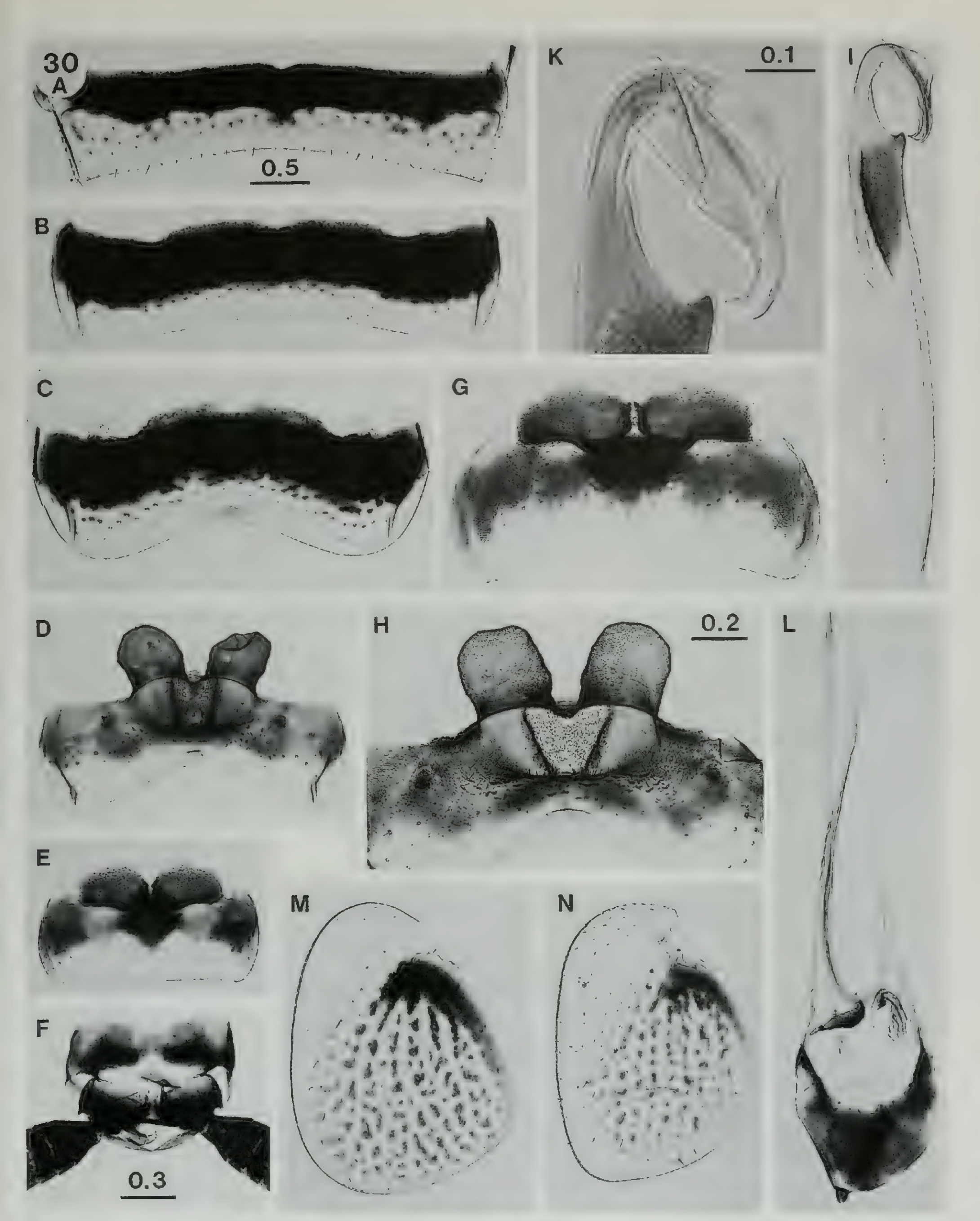



**Fig. 30.** *P. brevisacculata*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D; gland region: H), T8 (E,G), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A) Sp 260/14, (B-F,I-L) Sp 260/8 (Holotype), (G,H) Sp 260/9, (M) Sp 165/3, (N) Sp 260/13. Same scale (in mm) for (B-F,L-N) and (G-I).

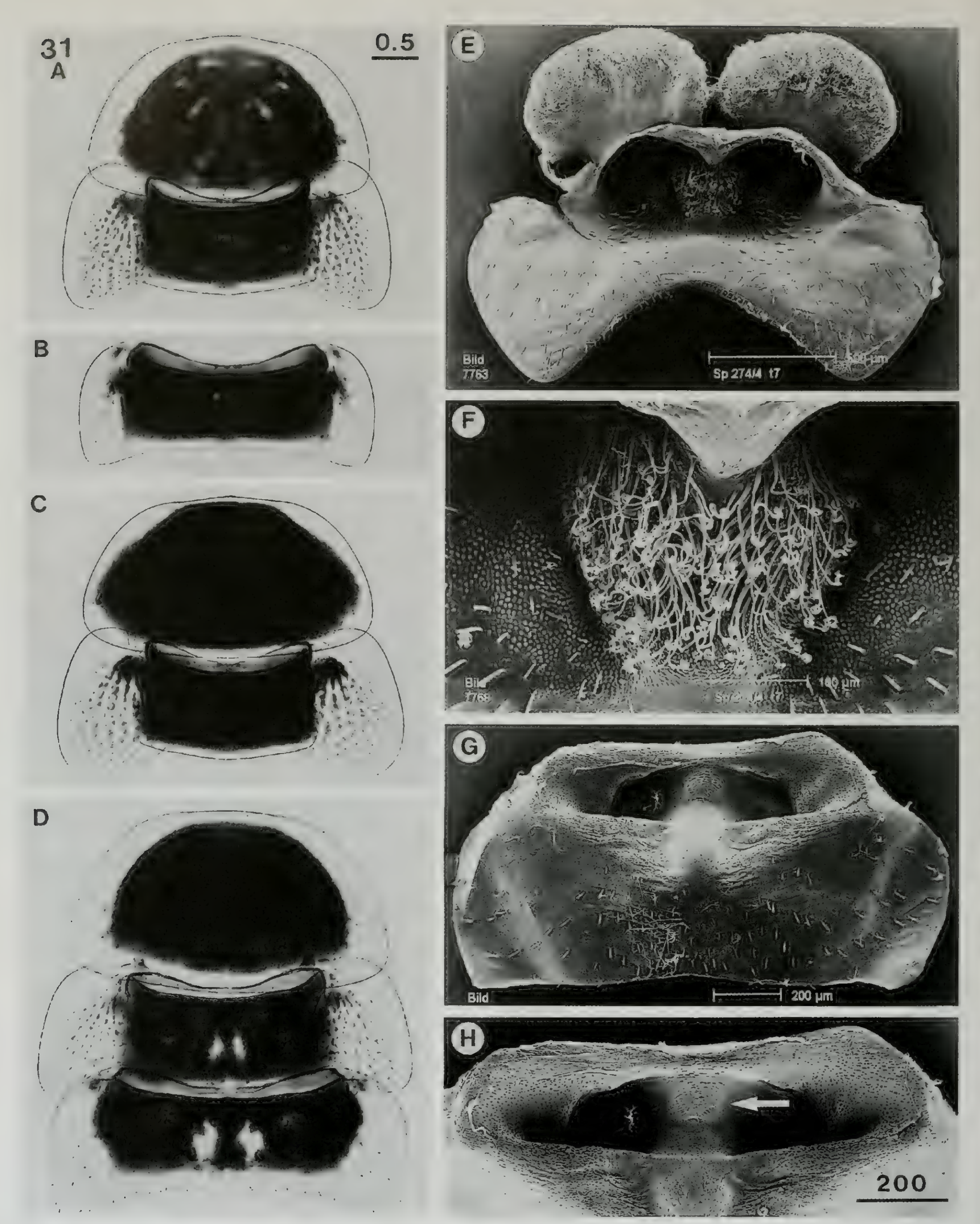



**Fig. 31.** *P. globososacculata*, male (A-C,E-H), female (D). (A-D) Thoracal segments: (A,C) pron. and meson., (B) metan., (D) complete thorax. (E-H) SEM pictures: T7 (E; bristle tuft: F), T8 (G; gland region: H, arrow points to bristle knob). Identification: (A,B) Sp 274/1 (Holotype), (C) Sp 14a/2, (D) Sp 13a/6, (E-H) Sp 274/4. Scale in (A) in mm, in (H) in µm; same scale for (A-D).

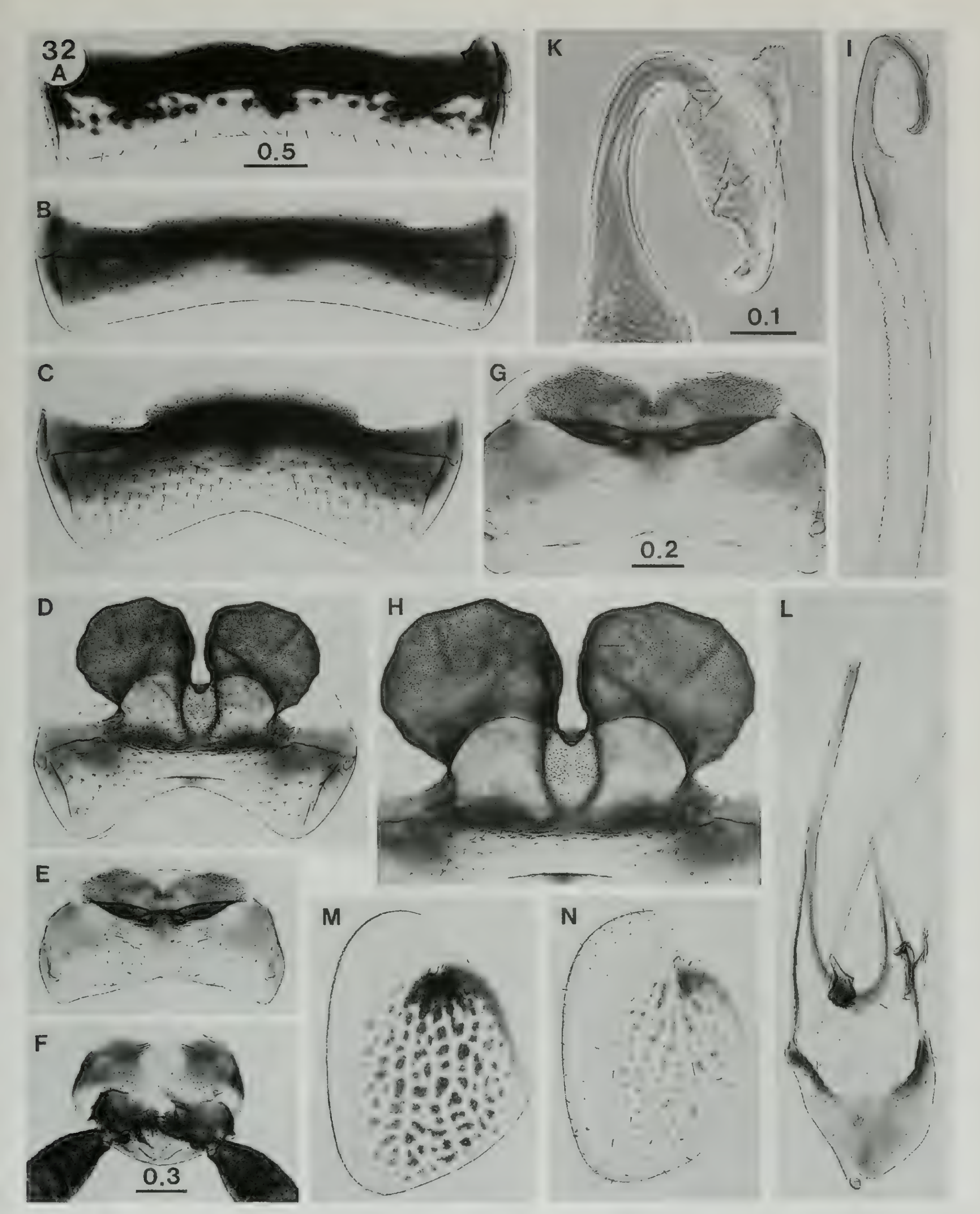



**Fig. 32.** *P. globososacculata*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D; gland region: H), T8 (E; gland region: G), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A) Sp 274/5, (B-I,L) Sp 274/1 (Holotype), (K) Sp 263/5, (M) Sp 98/2, (N) Sp 274/6. Same scale (in mm) for (B-F,L-N) and (G-I).

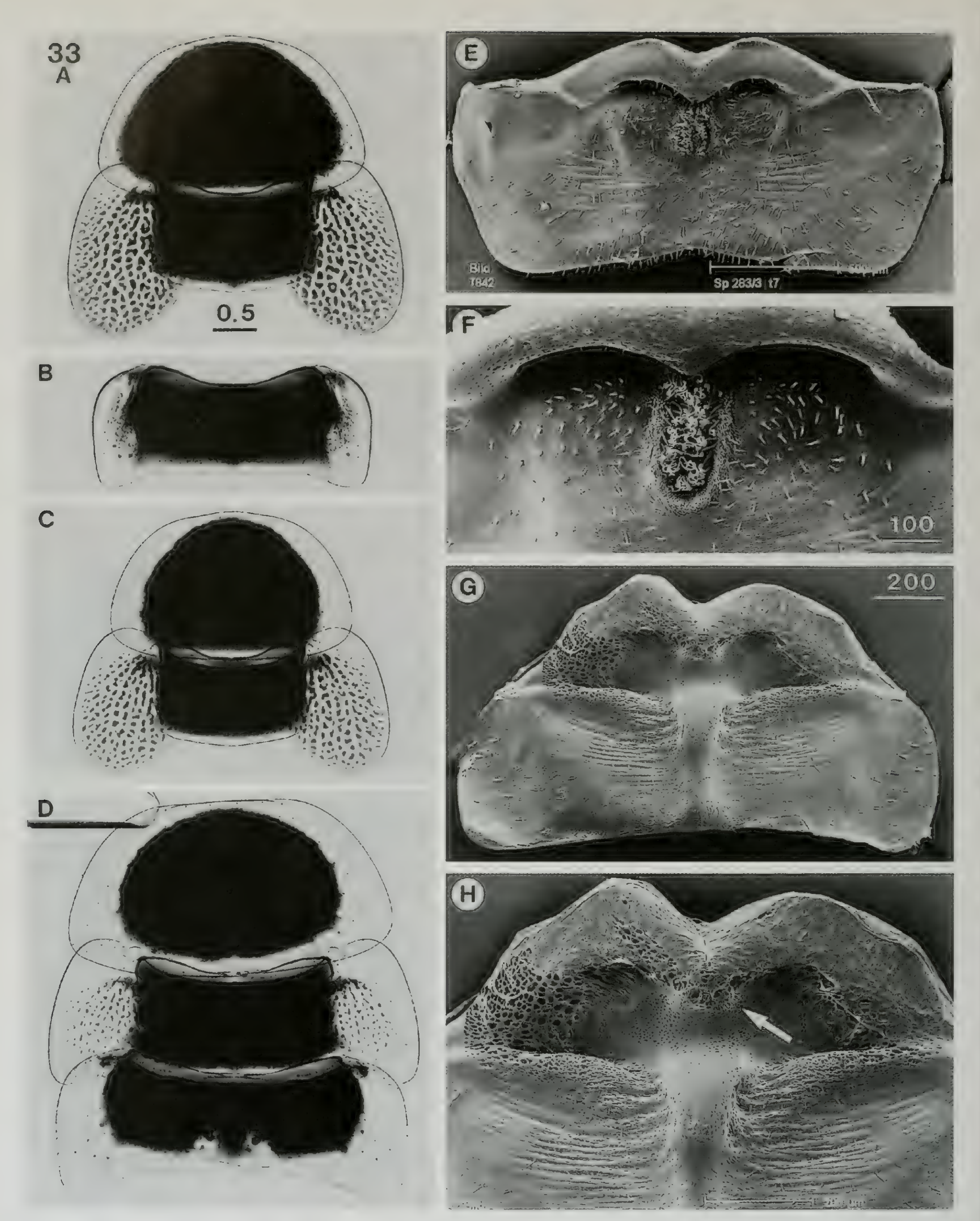



**Fig. 33.** *P. porosa*, male (A-C,E-H), female (D). (A-D) Thoracal segments: (A,C) pron. and meson., (B) metan., (D) complete thorax. (E-H) SEM pictures: T7 (E; gland region: F), T8 (G; gland region: H, arrow points to bristle knob). Identification: (A,B) Sp 283/2 (Holotype), (C) Sp 280/1, (D) Sp 283/5, (E) Sp 283/3, (F-H) Sp 280/4. Scale in (A) in mm, in (F,G) in µm; same scale for (A-D).

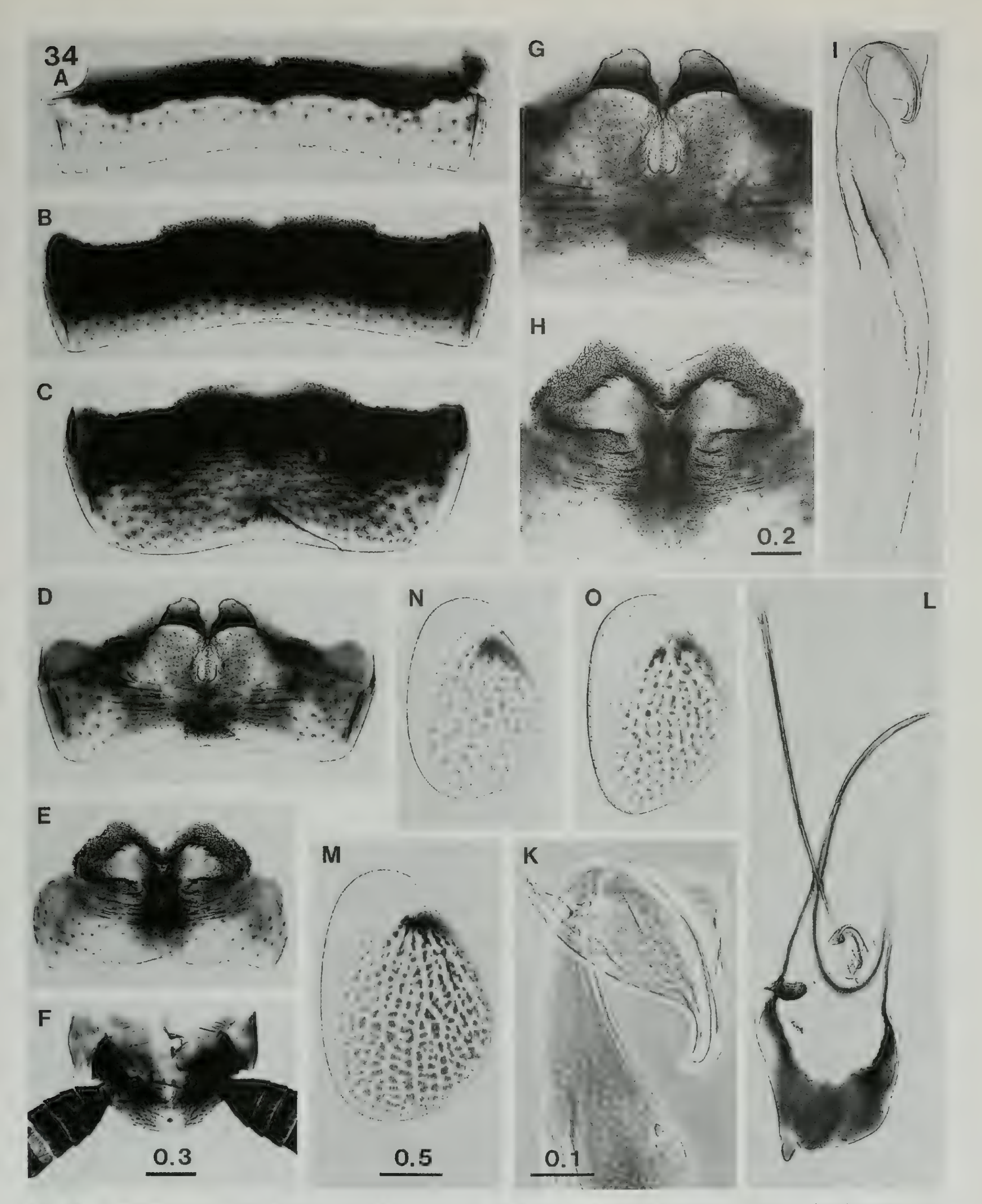



**Fig. 34.** *P. porosa*, male (B-M), female (A,N,O). T5 (A,B), T6 (C), T7 (D; gland region: G), T8 (E; gland region: H), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M-O). Identification: (A) Sp 283/4, (B-I,L) Sp 283/2 (Holotype), (K) Sp 282/1, (M) Sp 283/3, (N) Sp 280/4, (O) Sp 283/6. Same scale (in mm) for (A,M-O), (B-F,L) and (G-I).

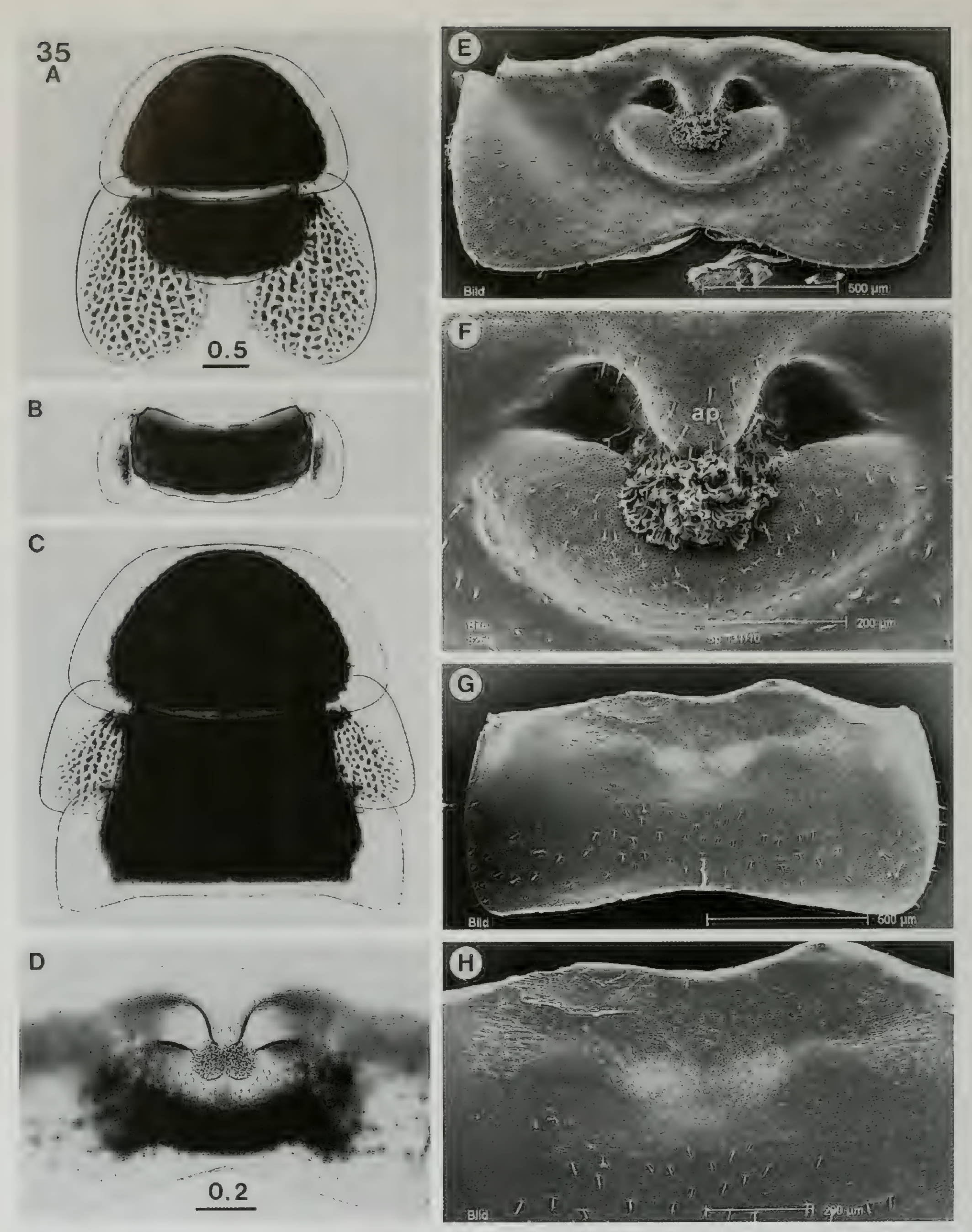



**Fig. 35.** *P. barbata*, male (A,B,D-H), female (C). (A-C) Thoracal segments: (A) pron. and meson., (B) metan., (C) complete thorax. (D) gland region of T7. (E-H) SEM pictures: T7 (E; gland region: F), T8 (G; gland region: H). Identification: (A,B) Sp 131/4 (Holotype), (C) Sp 123/7, (D) Sp 158/3, (E-H) Sp131/10. Same scale (in mm) for (A-C). – Abbreviations: (ap) anterior process.

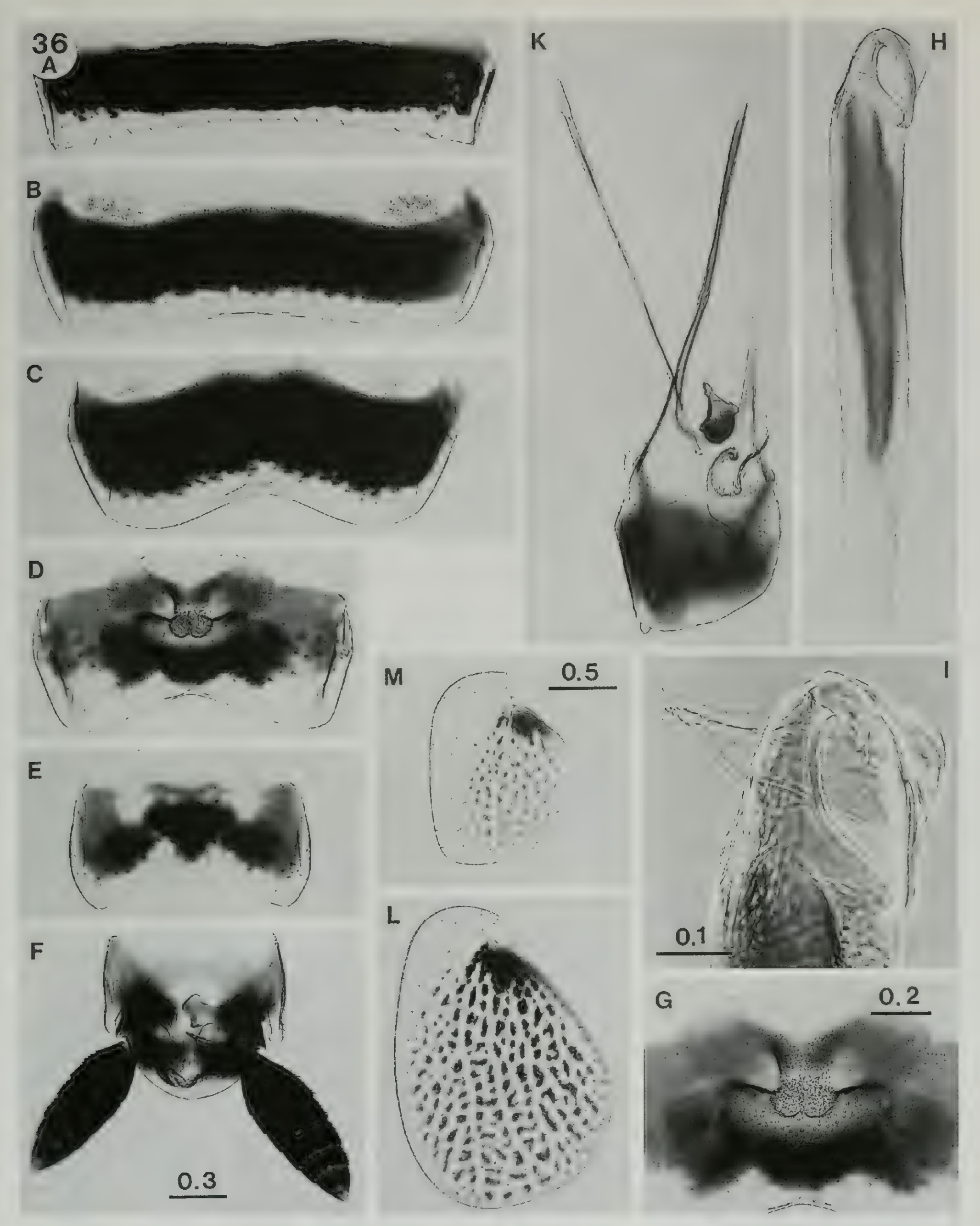



**Fig. 36.** *P. barbata*, male (B-L), female (A,M). T5 (A,B), T6 (C), T7 (D; gland region: G), T8 (E), T9+10 (F), hook of left phallomere (H,I), subgenital plate (K), forewings (L,M). Identification: (A) Sp 123/7, (B) Sp 129/3, (C-K) Sp 131/4 (Holotype), (L) Sp 131/8, (M) Sp 123/8. Same scale (in mm) for (A,L,M), (B-F,K), and (G,H).

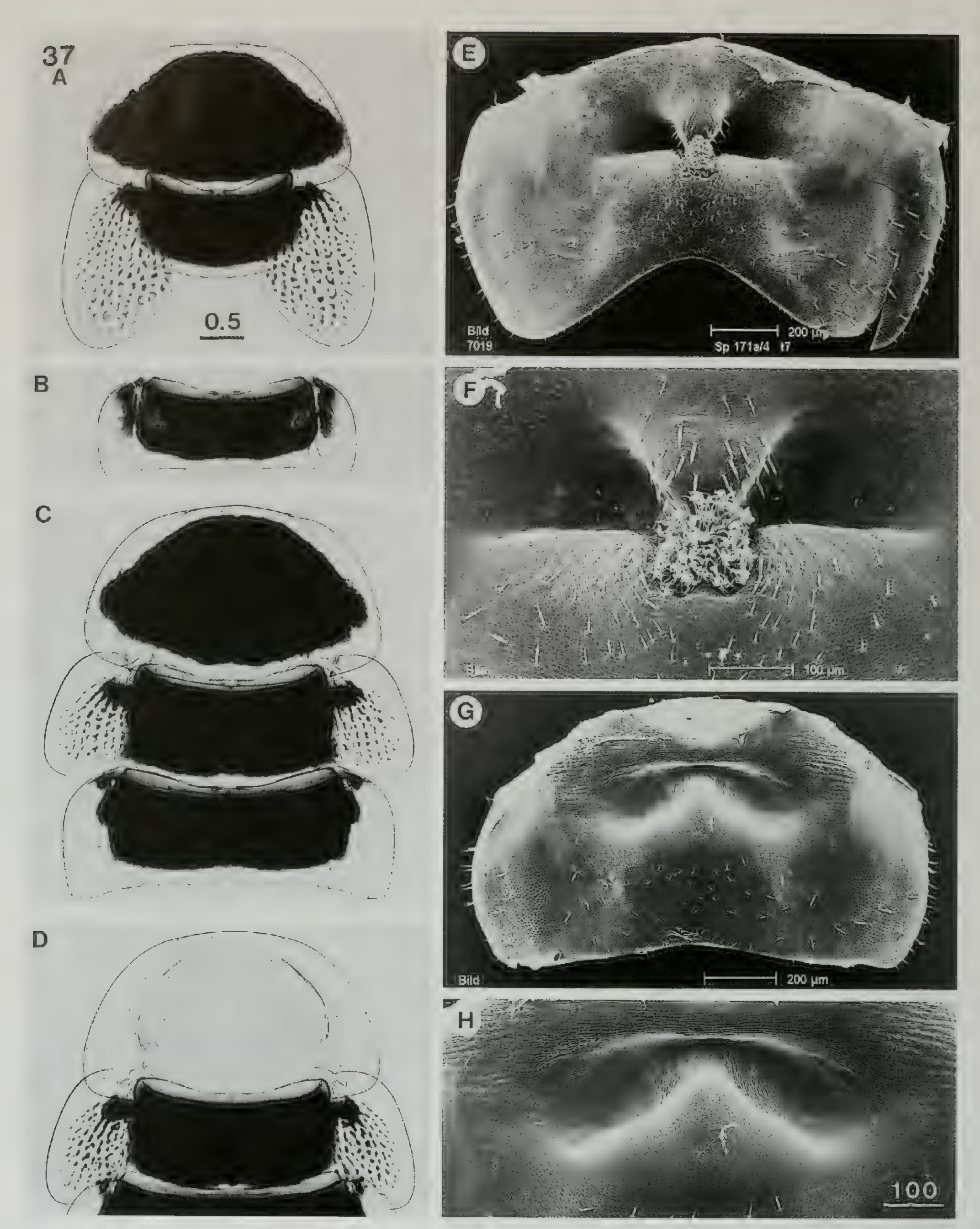



**Fig. 37.** *P. acuminata*, male (A,B,E-H), female (C,D). (A-D) Thoracal segments: (A,D) pron. and meson., (B) metan., (C) complete thorax. (E-H) SEM pictures: T7 (E; gland region: F), T8 (G; gland region: H). Identification: (A,B) Sp 171a/2 (Holotype), (C) Sp 171/14, (D,E) Sp 171a/4, (F-H) Sp 171a/3. Scale in (A) in mm, in (H) in µm; same scale for (A-D).

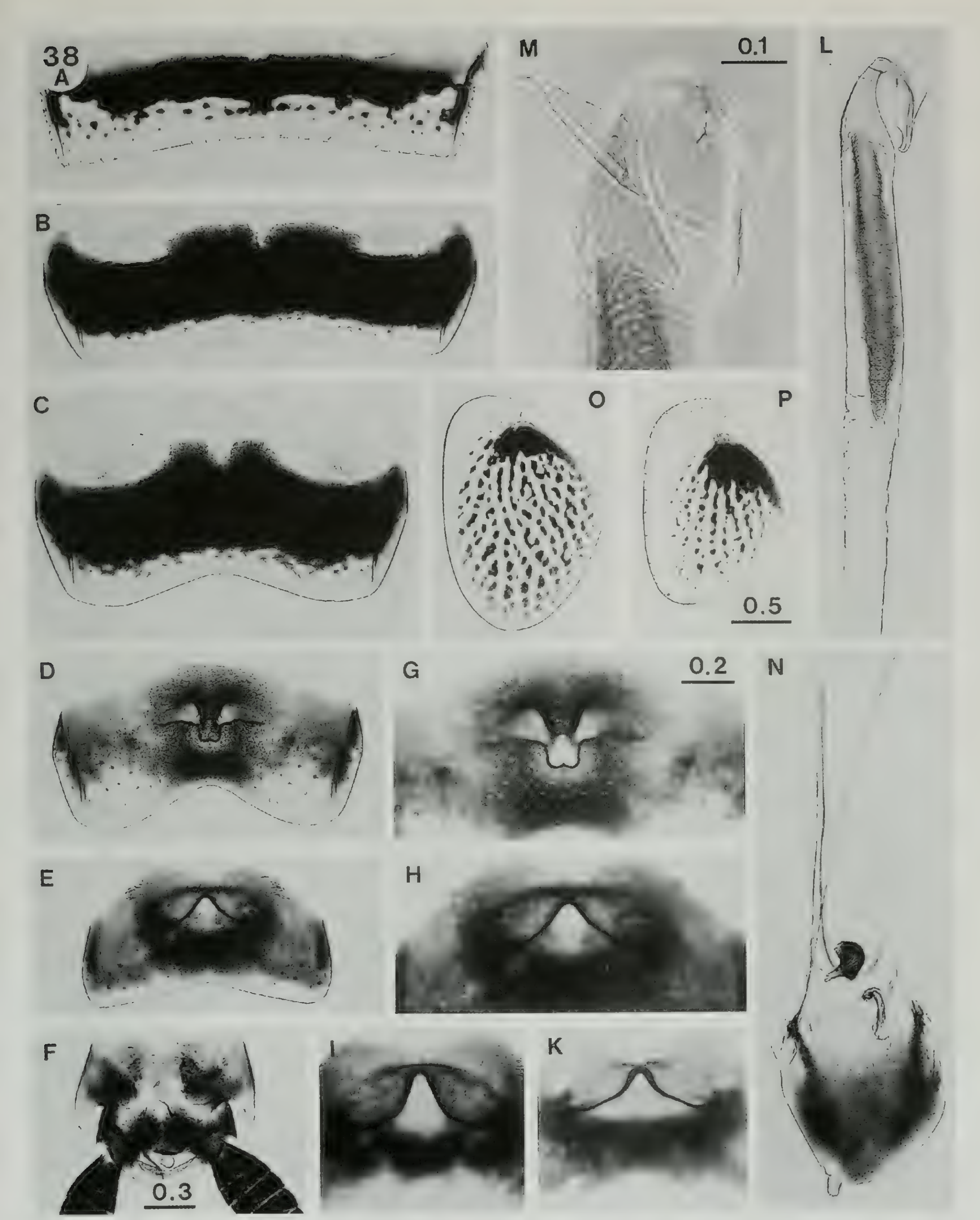



**Fig. 38.** *P. acuminata*, male (B-O), female (A,P). T5 (A,B), T6 (C), T7 (D; gland region: G), T8 (E; gland region: H-K), T9+10 (F), hook of left phallomere (L,M), subgenital plate (N), forewings (O,P). Identification: (A) Sp 174a/4, (B-H) Sp 171a/2 (Holotype), (I,L,M) Sp 175a/2, (K) Sp 87/4, (N) Sp 174a/2, (O) Sp 176a/4, (P) Sp 171/15. Same scale (in mm) for (A,O,P), (B-F,N), and G-K,L).

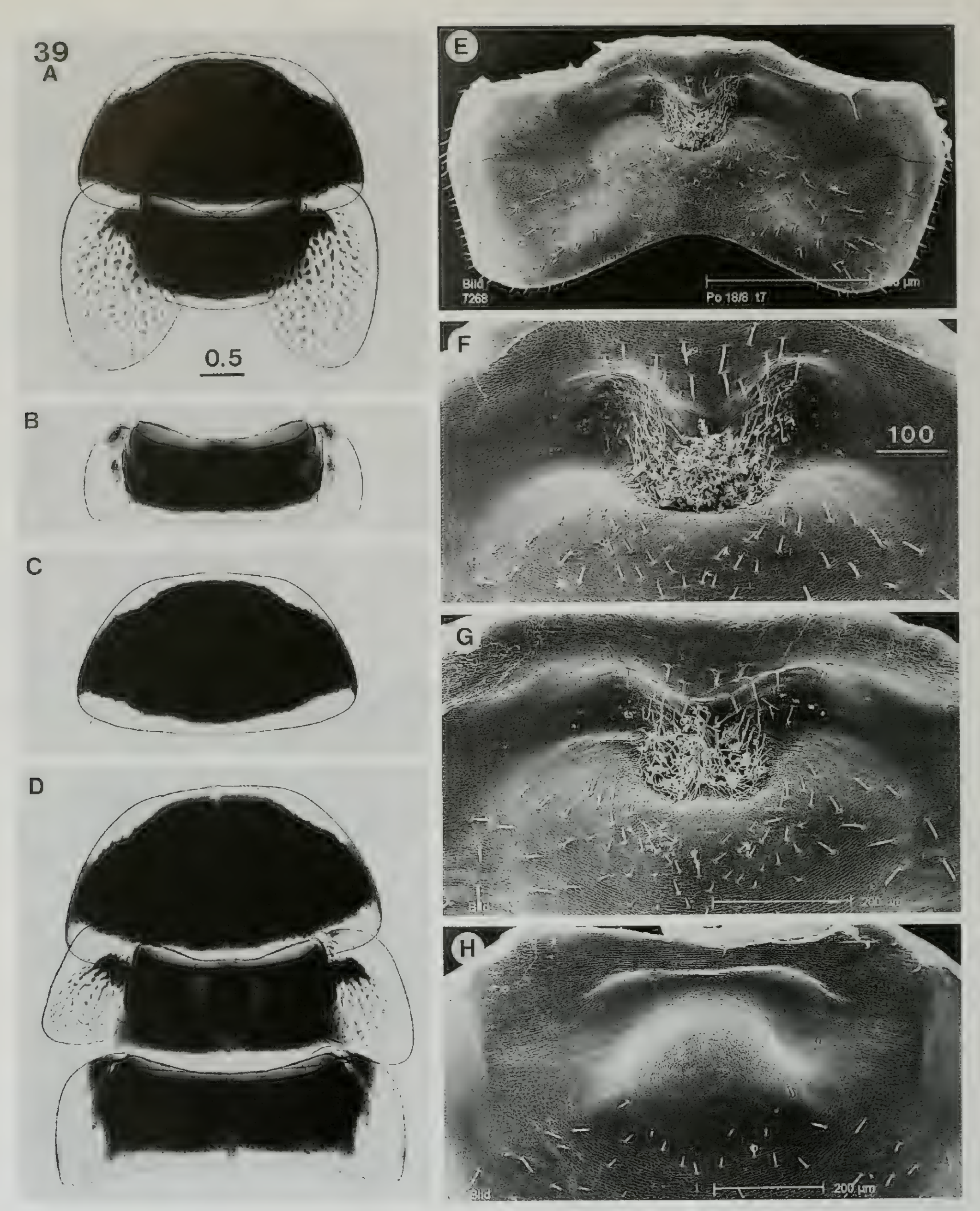



**Fig. 39.** *P. lativittata*, male (A-C,E-H), female (D). (A-D) Thoracal segments: (A) pron. and meson., (B) metan., (C) pron., (D) complete thorax. (E-H) SEM pictures: T7 (E; gland region: F,G), gland region of T8 (H). Identification: (A) Po 18/4, (B,C) Po 18/7 (Holotype), (D) Po 18/10, (E,F,H) Po 18/8, (G) Po 18/9. Scale in (A) in mm, in (F) in µm; same scale for (A-D).

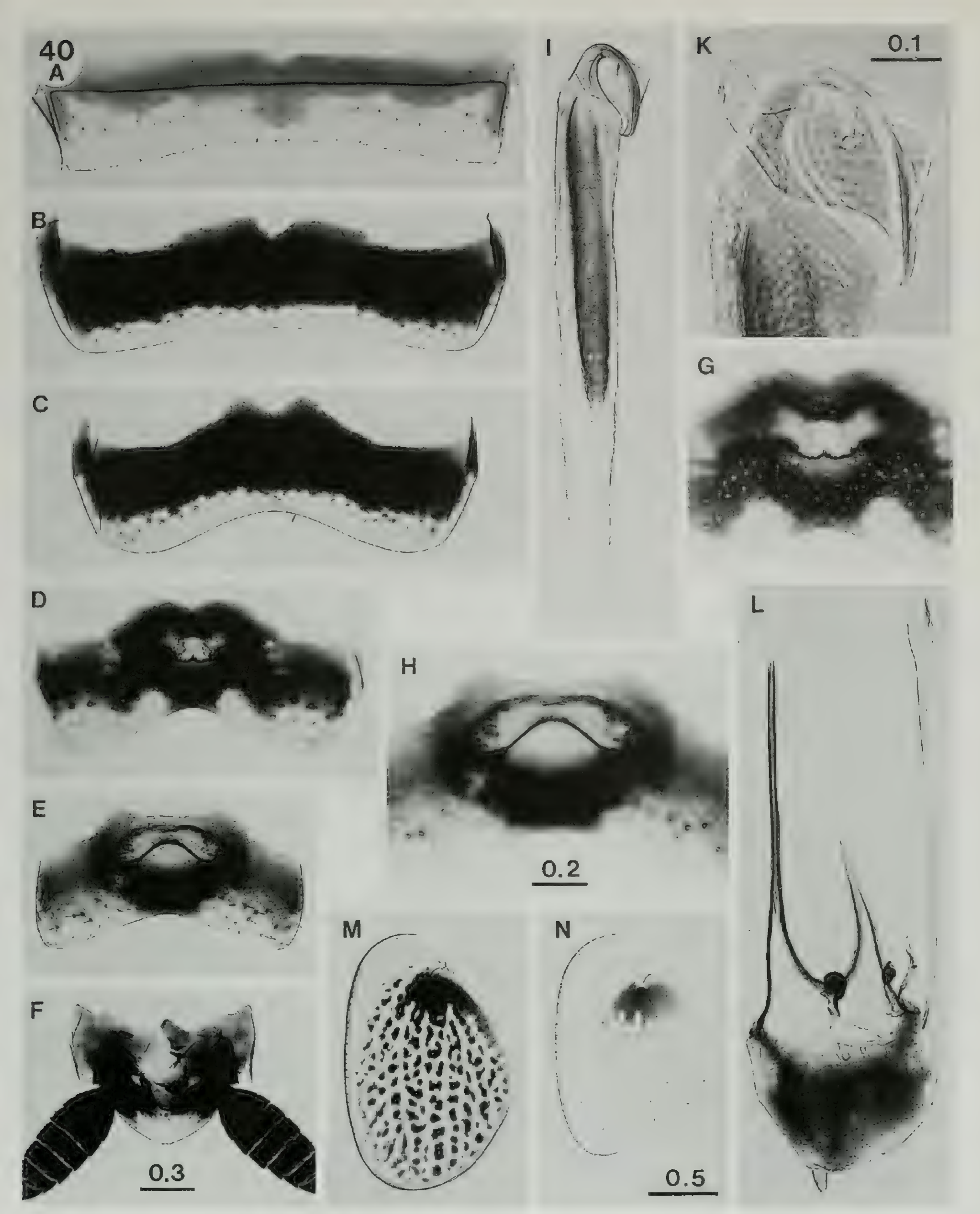



**Fig. 40.** *P. lativittata*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D; gland region: G), T8 (E; gland region: H), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A) Po 18/12, (B-M) Po 18/7 (Holotype), (N) Po 18/11. Same scale (in mm) for (A,M,N), (B-F,L), and (G,H,I).

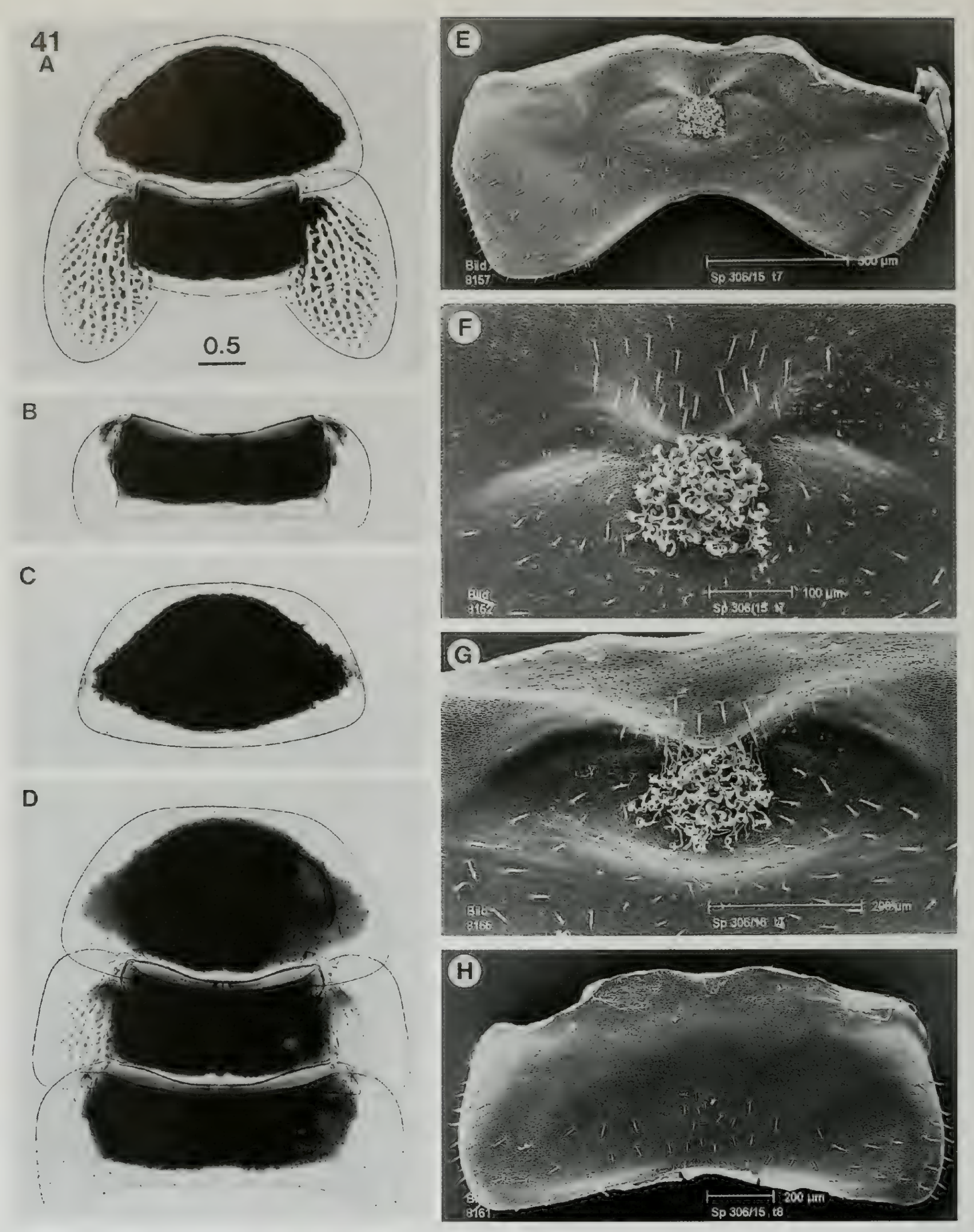



**Fig. 41.** *P. rhomboidea*, male (A-C,E-H), female (D). (A-D) Thoracal segments: (A) pron. and meson., (B) metan., (C) pron., (D) complete thorax. (E-H) SEM pictures: T7 (E; gland region: F,G), T8 (H). Identification: (A) Sp 306/2, (B,C) Sp 306/3 (Holotype), (D) Sp 306/13, (E,F,H) Sp 306/15, (G) Sp 306/16. Same scale (in mm) for (A-D).

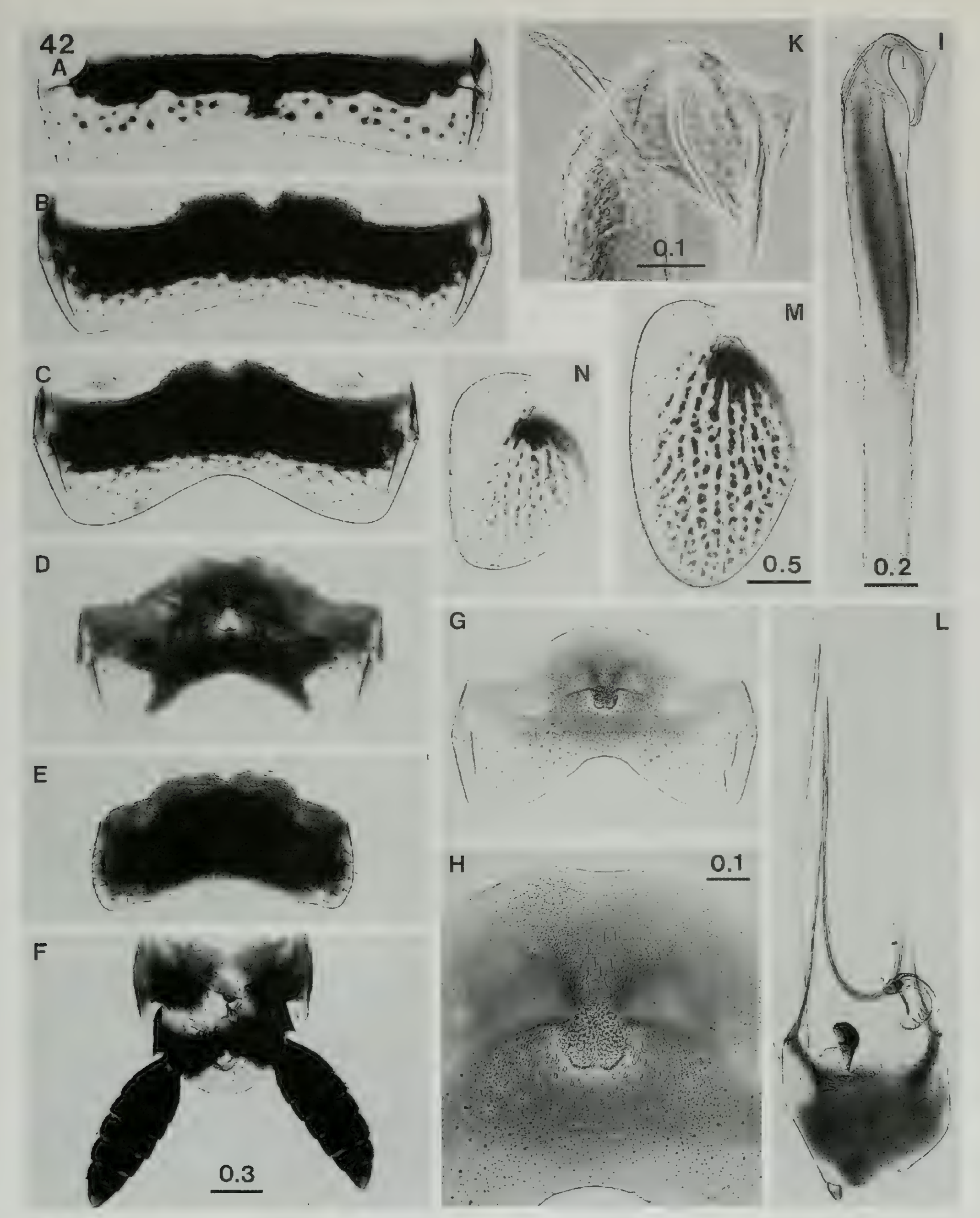



**Fig. 42.** *P. rhomboidea*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D,G; gland region: H), T8 (E), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A) Sp 306/13, (B-E,L,M) Sp 306/3 (Holotype), (F) Sp 260/2, (G,H) Sp 176a/7 (bleached to show the shape of the gland), (I,K) Sp 176a/2, (N) Sp 306/14. Same scale (in mm) for (A,M,N) and (B-G,L).

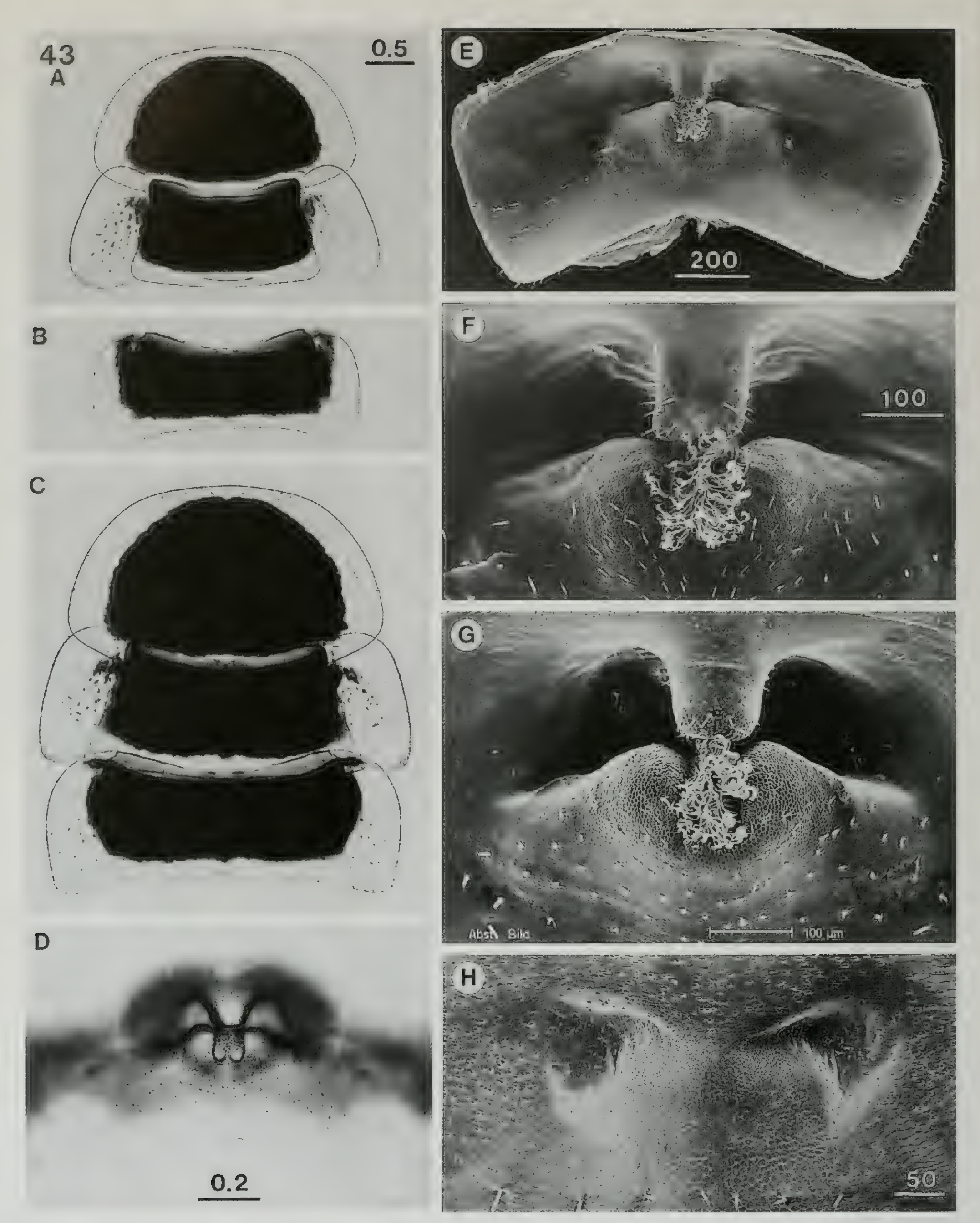



**Fig. 43.** *P. carpetana*, male (A,B,D-H), female (C). (A-C) Thoracal segments: (A) pron. and meson., (B) metan., (C) complete thorax. (D) gland region of T7. (E-H) SEM pictures: T7 (E; gland region: F,G), gland region of T8 (H). Identification: (A,B) Sp176a/1, (C) Sp 183/4, (D) Sp 332/2, (E,F) Sp 306/20, (G) Sp 306/4, (H) Sp 306/17. Scale in (A,D) in mm, in (E,F,H) in µm; same scale for (A-C).

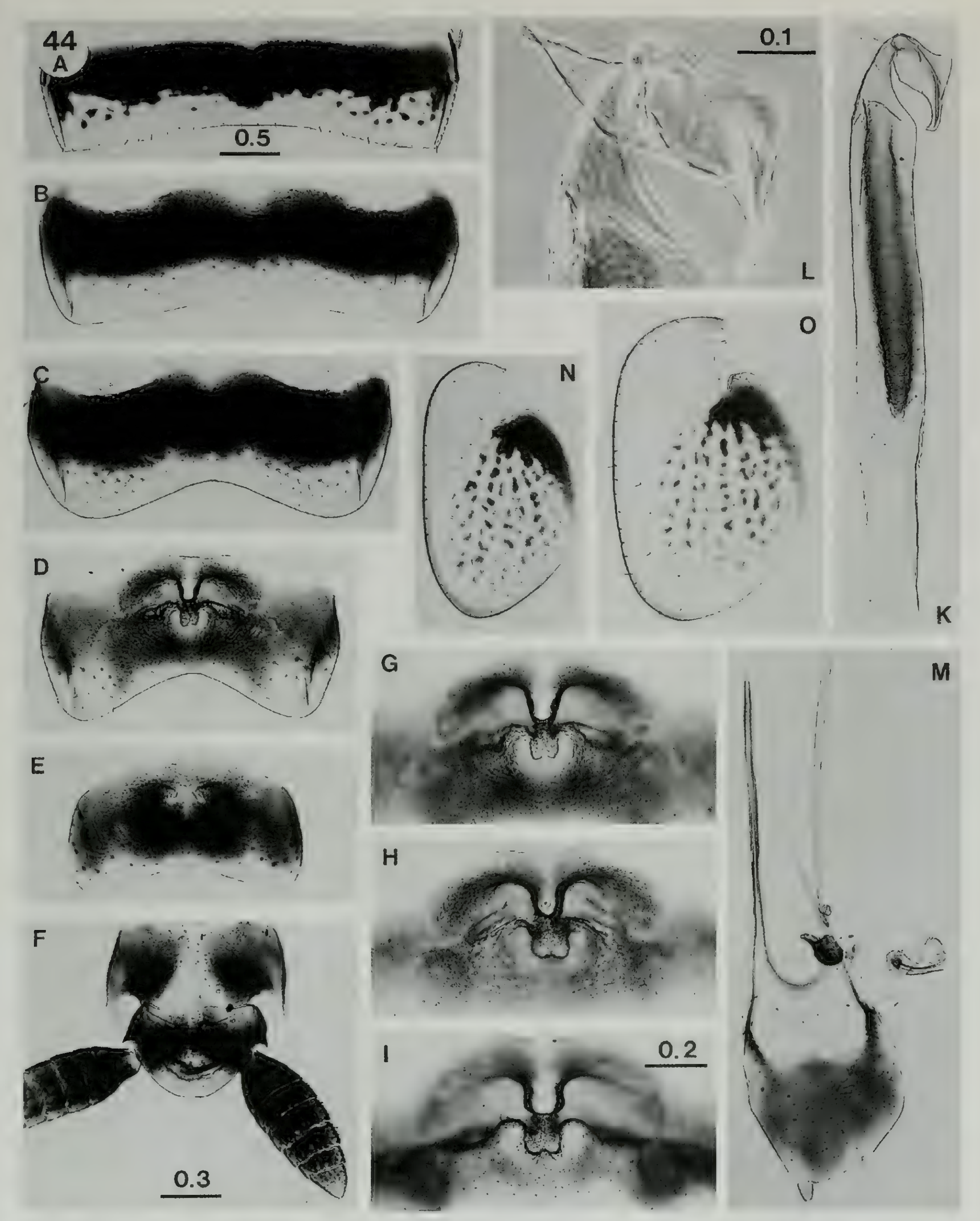



**Fig. 44.** *P. carpetana*, male (B-N), female (A,O). T5 (A, B), T6 (C), T7 (D; gland region: G-I), T8 (E), T9+10 (F), hook of left phallomere (K,L), subgenital plate (M), forewings (N,O). Identification: (A) Sp 183/4, (B-G,K-M) Sp 176a/1, (H) Sp 178/2, (I) Sp 334/1,(N) Sp 6a/1, (O) Sp 183/5. Same scale (in mm) for (B-F,M-O) and (G-K).

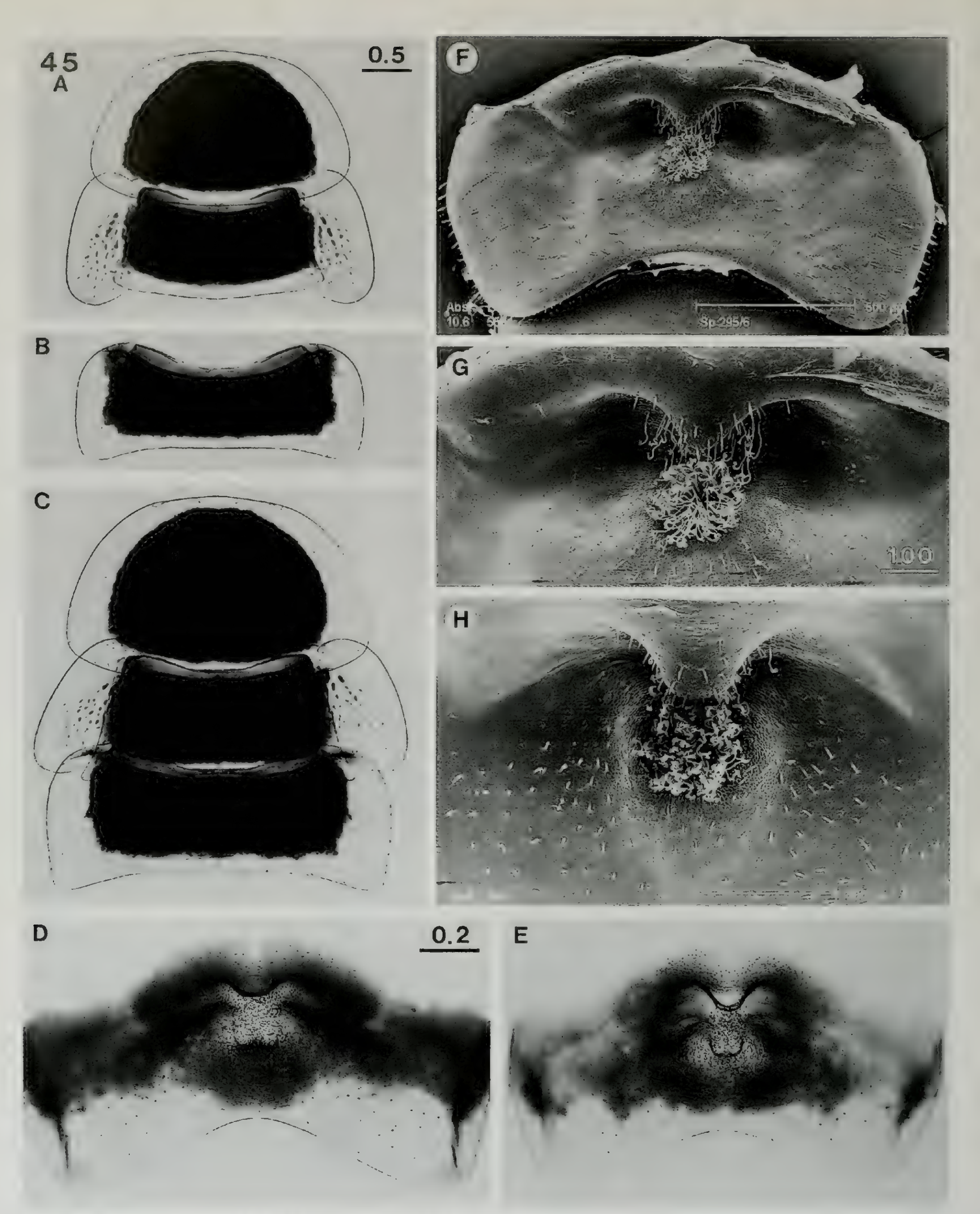



**Fig. 45.** *P. acarinata*, male (A,B,D-H), female (C). (A-C) Thoracal segments: (A) pron. and meson., (B) metan., (C) complete thorax. (D,E) T7. (F-H) SEM pictures: T7 (F; gland region: G,H). Identification: (A,B) Sp 295/3, (C) Sp 184/5, (D) Sp 175a/3, (E) Sp 185/1, (F,G) Sp 295/6, (H) Sp 184/4. Scale in (A,D) in mm, in (G) in µm; same scale for (A-C) and (D,E).

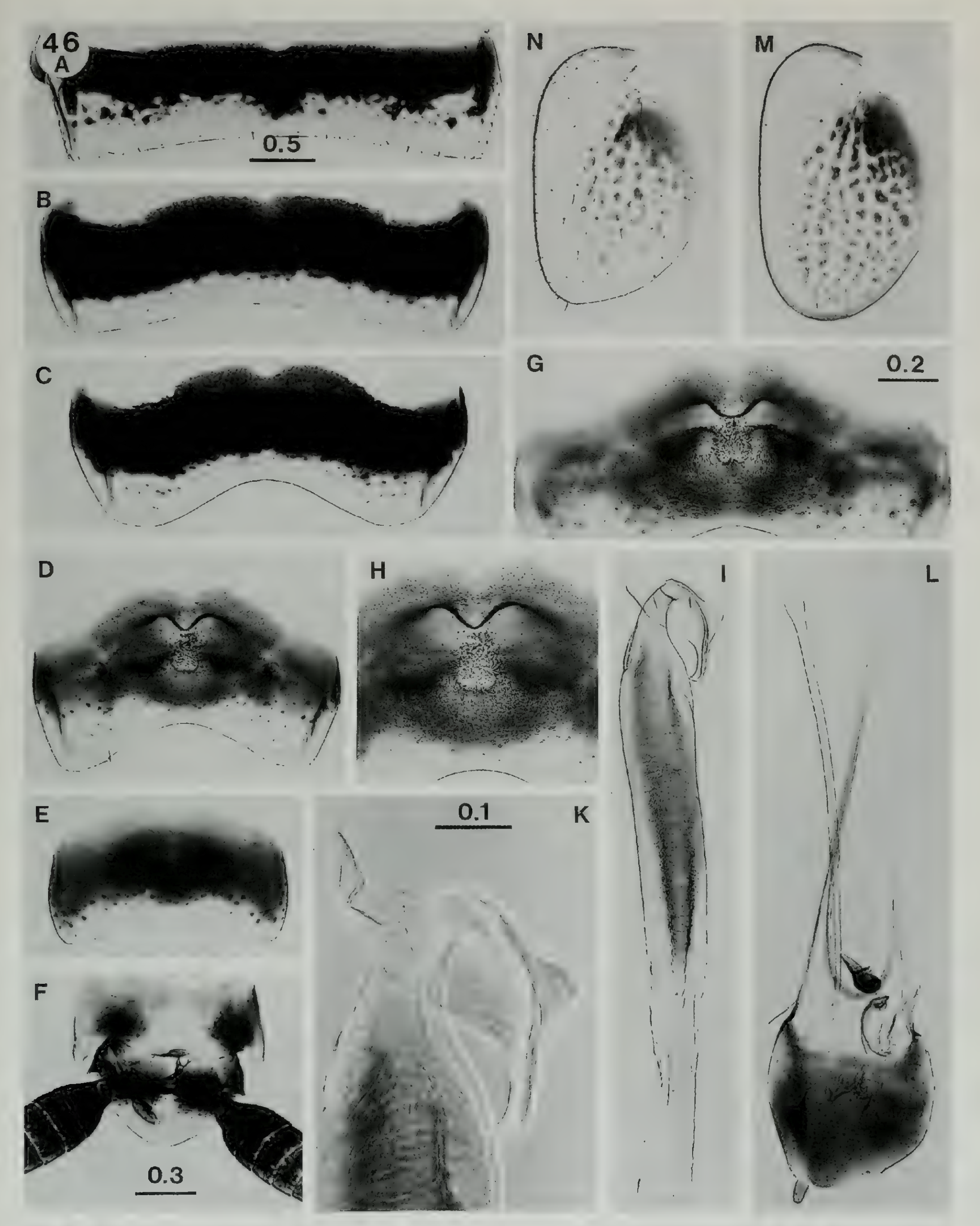



**Fig. 46.** *P. acarinata*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D,G; gland region: H), T8 (E), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A) Sp 184/5, (B-E,H-M) Sp 295/2 (Holotype), (F) Sp 295/3, (G) Sp 184/2, (N) Sp 184/6. Same scale (in mm) for (B-F,L-N) and (G-I).

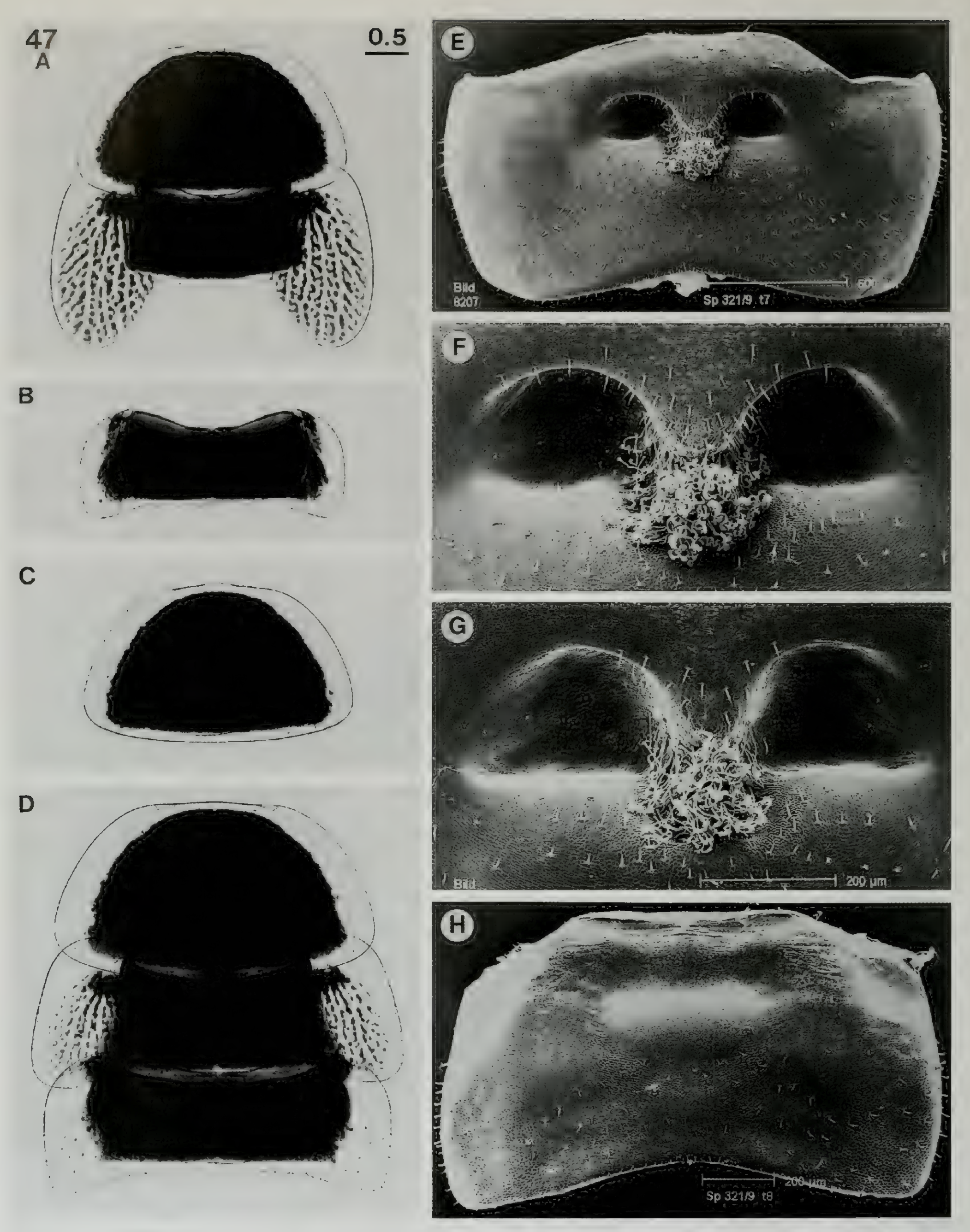



**Fig. 47.** *P. crassirostris*, male (A-C,E-H), female (D). (A-D) Thoracal segments: (A) pron. and meson., (B) metan., (C) pron., (D) complete thorax. (E-H) SEM pictures: T7 (E; gland region: F,G), T8 (H). Identification: (A) Sp 321/5, (B,C) Sp 321/4 (Holotype), (D) Sp 321/8, (E,F,H) Sp 321/11, (G) Sp 321/10. Scale in (A) in mm; same scale for (A-D) and (F,G).




**Fig. 48.** *P. crassirostris*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D; gland region: G,H), T8 (E), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A) Sp 321/8, (B,C,H-M) Sp 321/4 (Holotype), (D,E,G) Sp 321/5, (F) Sp 321/3, (N) Sp 321/9. Same scale (in mm) for (A,M,N), (B-F,L), and (G-I).

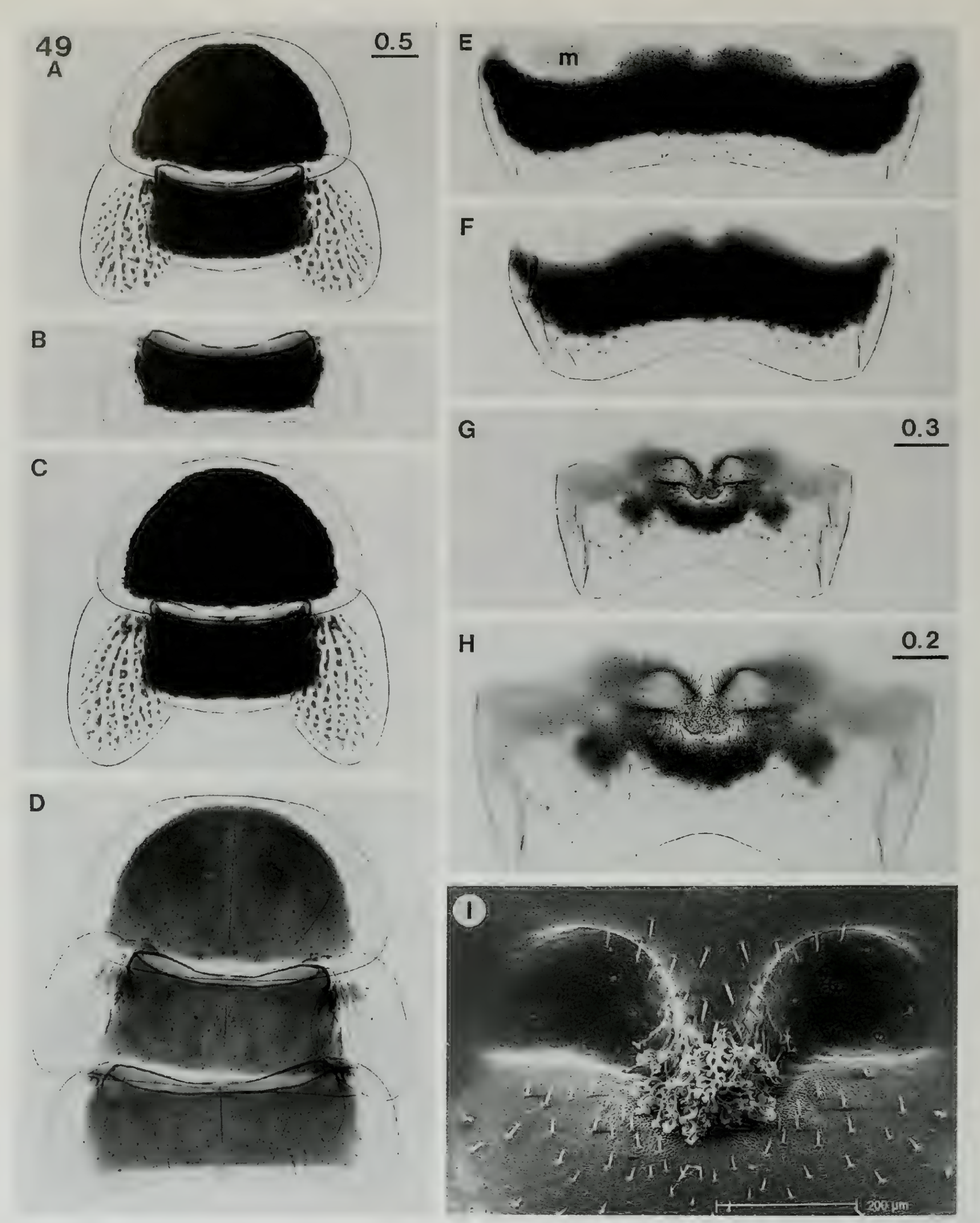



**Fig. 49.** (A-D) *P. tenuirostris*, male (A-C), female (D). Thoracal segments: (A,C) pron. and meson., (B) metan., (D) complete thorax. (E-I) *P. fernandesiana*, male. T5 (E), T6 (F), T7 (G,H; SEM picture of gland region: I). Identification: (A,B) Sp 164/5 (Holotype), (C) Sp 164/4, (D) Sp 165/4, (E-H) Po 30/1, (I) Po 29/6. Same scale (in mm) for (A-D) and (E-G). – Abbreviations: (m) membrane pouch.

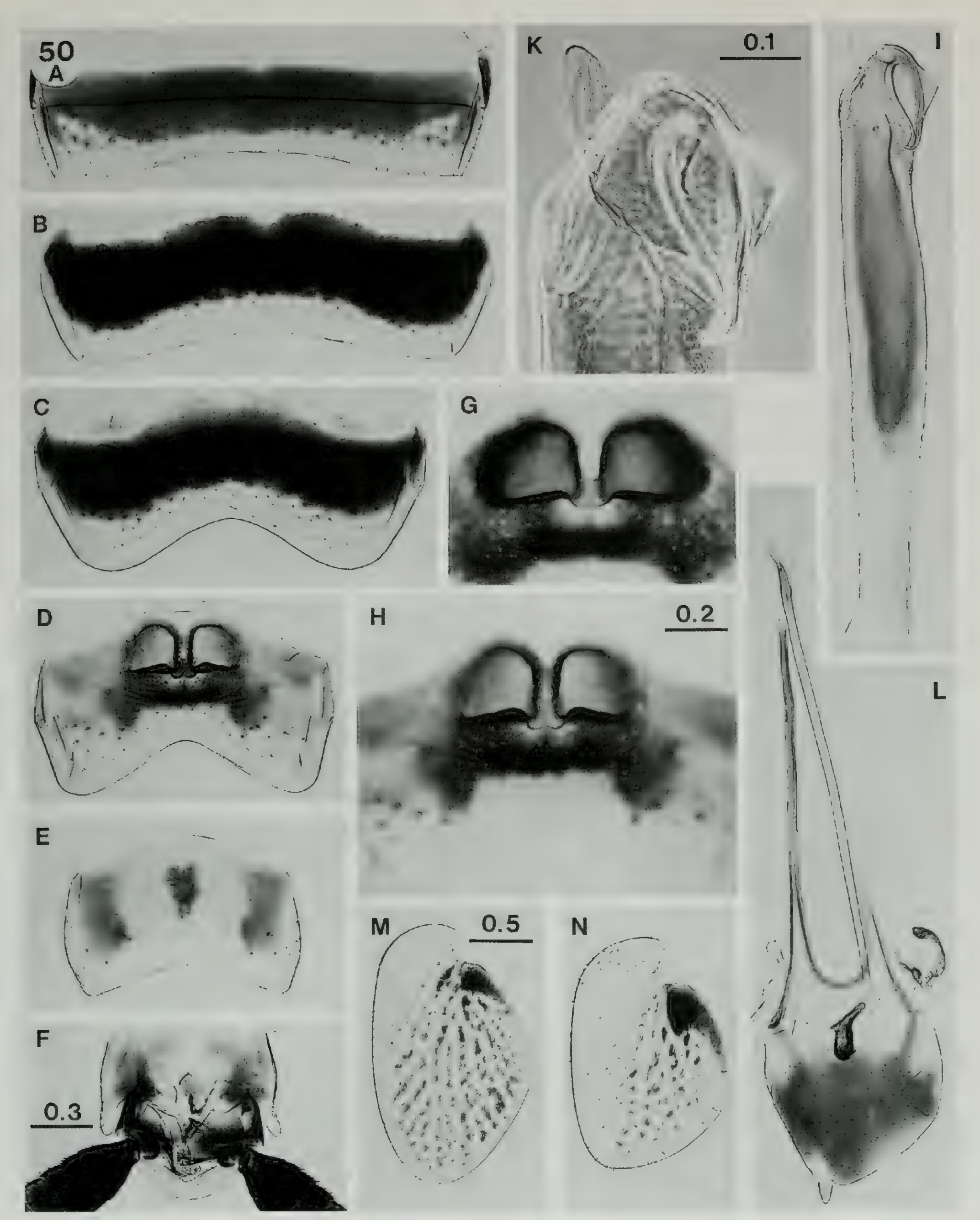



**Fig. 50.** *P. tenuirostris*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D; gland region: G,H), T8 (E), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A) Sp 165/4, (B-F,H,L) Sp 164/5 (Holotype), (G,I,K) Sp 165/1, (M) Sp 165/3, (N) Sp 164/8. Same scale (in mm) for (A,M,N), (B-F,L), and (G-I).

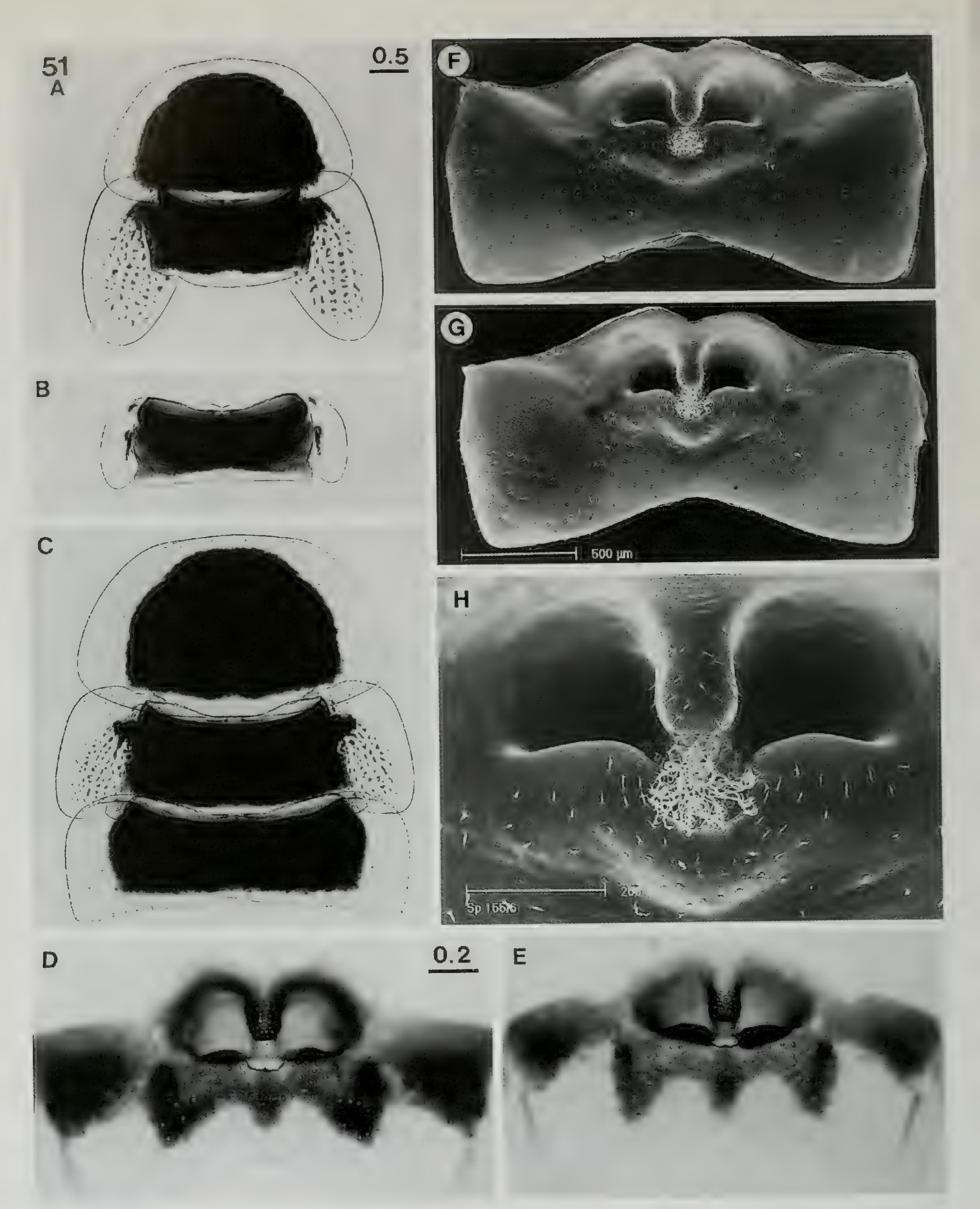



**Fig. 51.** *P. bolivariana*, male (A,B,D-H), female (C). (A-C) Thoracal segments: (A) pron. and meson., (B) metan., (C) complete thorax. (D,E) T7. (F-H) SEM pictures: T7 (F,G; gland region: H). Identification: (A,B) Sp 127/6 (Holotype), (C) Sp 155/3, (D) Bo 168, (E) Sp 121/2, (F) Sp 155/5, (G,H) Sp 155/6. Scale in (A,D) in mm; same scale for (A-C), (D,E) and (F,G).

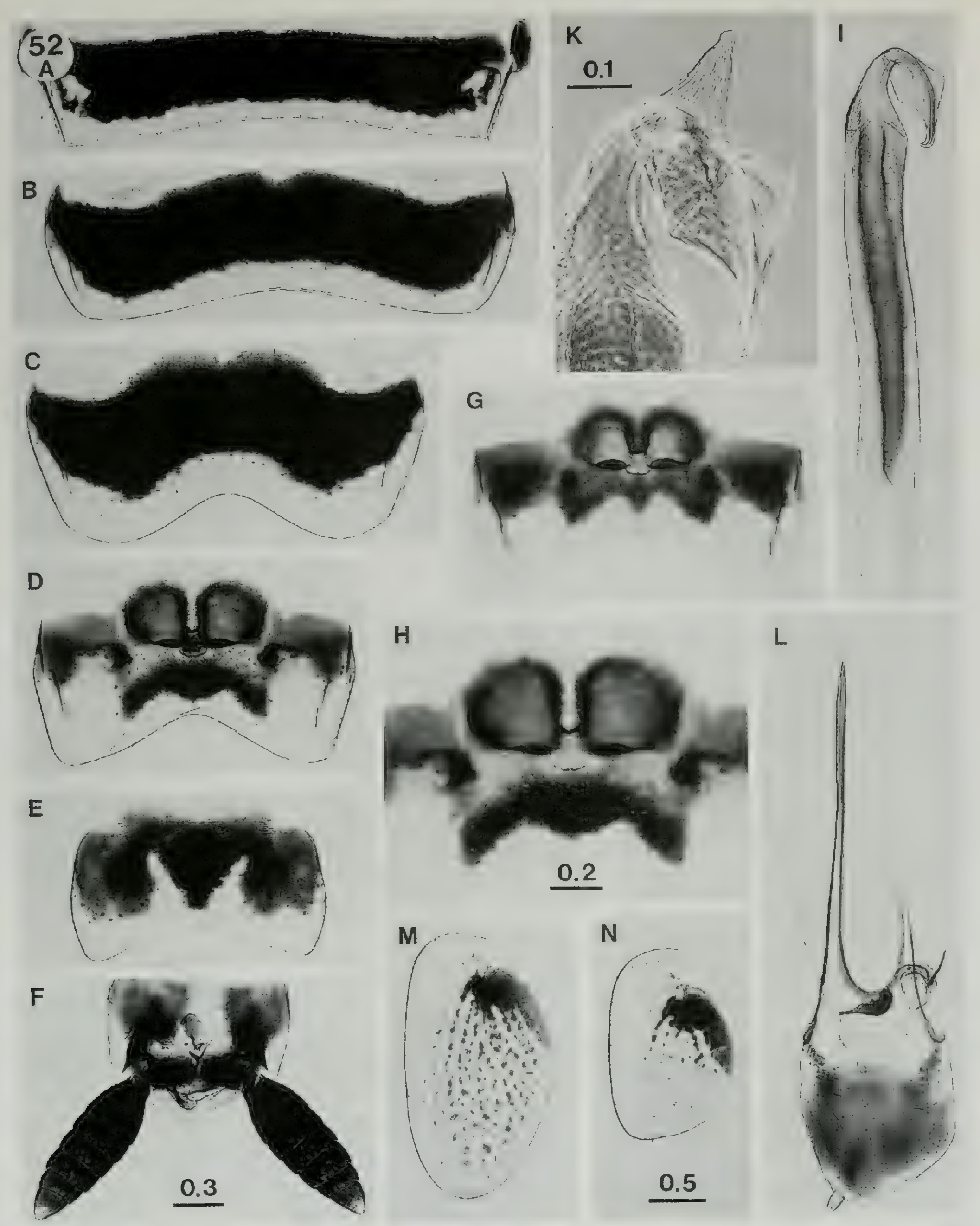



**Fig. 52.** *P. bolivariana*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D,G; gland region: H), T8 (E), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A) Sp 155/3, (B-F,H-L) Sp 127/6 (Holotype), (G) Bo 168, (M) Sp 127/7, (N) Sp 155/4. Same scale (in mm) for (A,M,N), (B-G,L) and (H,I).

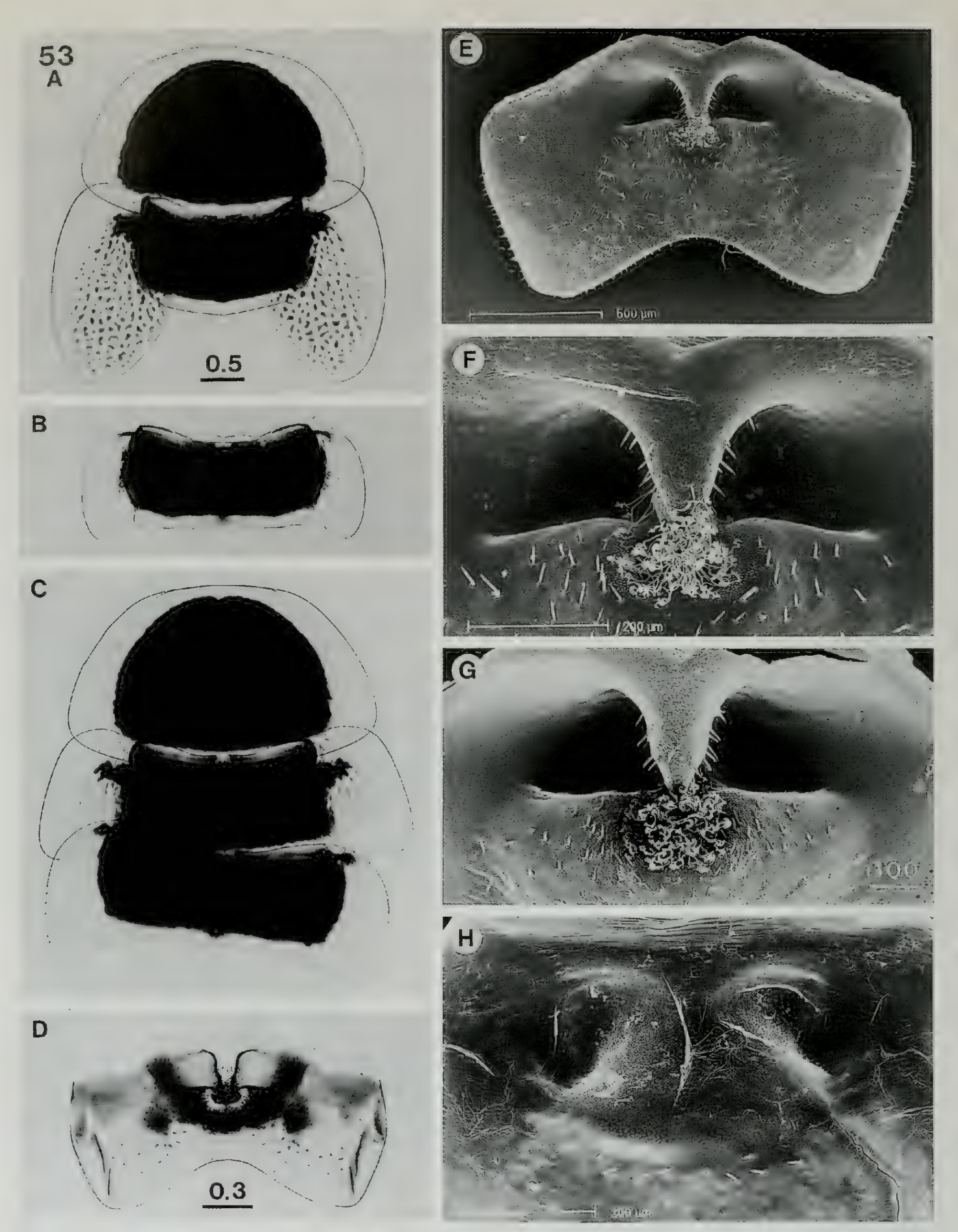



**Fig. 53.** *P. atlantica*, male (A,B,D-H), female (C). (A-C) Thoracal segments: (A) pron. and meson., (B) metan., (C) complete thorax. (D) T7. (E-H) SEM pictures: T7 (E; gland region: F,G), gland region of T8 (H). Identification: (A,B) Sp 311/3 (Holotype), (C) Sp 311/7, (D) Sp 311/4, (E,F,H) Sp <u>311</u>/10, (G) Sp 311/5. Scale in (A,D) in mm, in (G) in µm; same scale for (A-C).

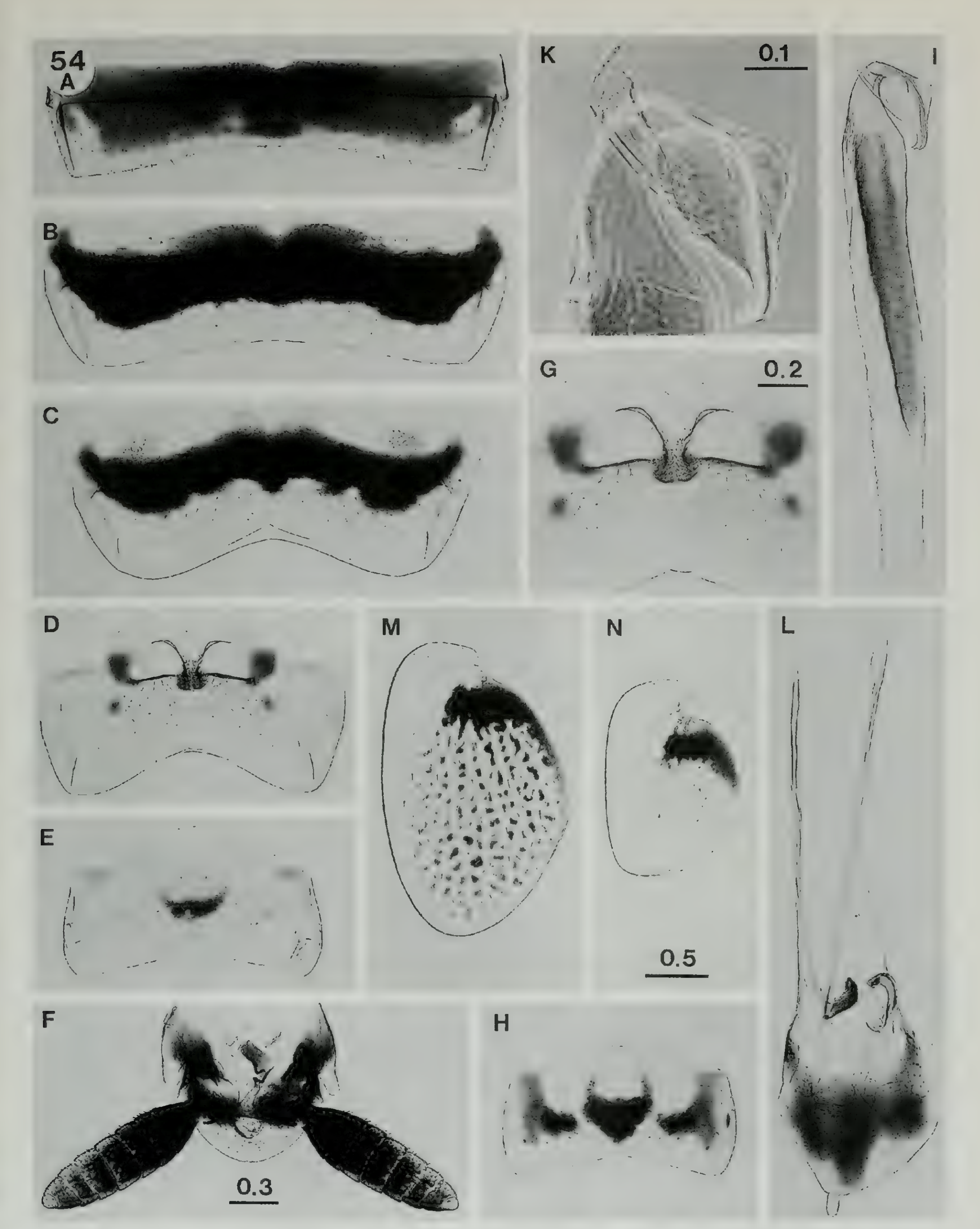



**Fig. 54.** *P. atlantica*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D; gland region: G), T8 (E,H), T9+10 (F), hook of left phallomere (I,K), subgenital plate (L), forewings (M,N). Identification: (A) Sp 311/12, (B-G,I-L) Sp 311/3 (Holotype), (H) Sp 311/2, (M) Sp 311/4, (N) Sp 311/8. Same scale (in mm) for (A,M,N), (B-F,H,L), and (G,I).

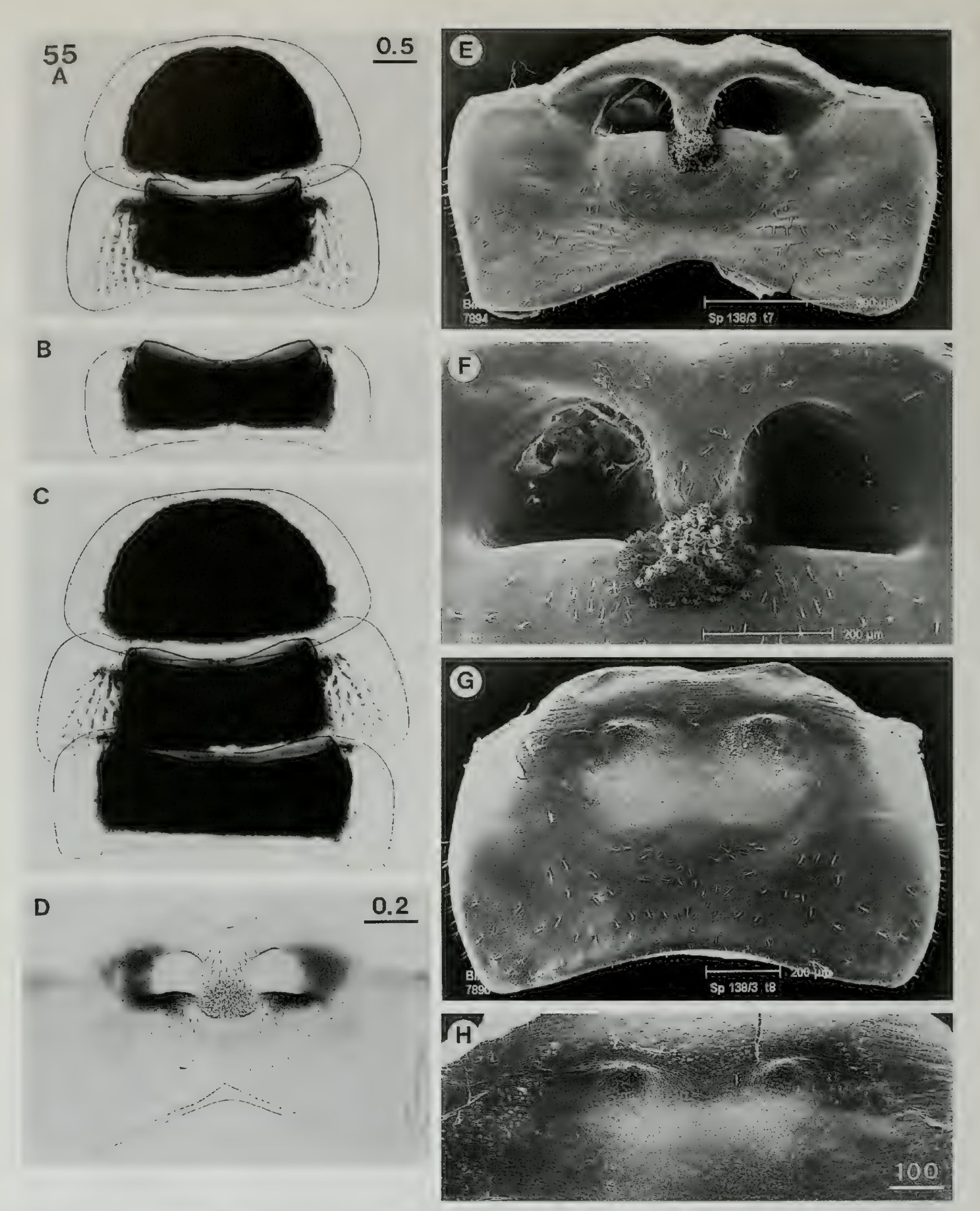



**Fig. 55.** *P. fernandesiana*, male (A,B,D-H), female (C). (A-C) Thoracal segments: (A) pron. and meson., (B) metan., (C) complete thorax. (D) gland region of T7. (E-H) SEM pictures: T7 (E; gland region: F), T8 (G; gland region: H). Identification: (A,B) Sp 138/2 (Holotype), (C) Sp 138/5, (D) Po 18/6, (E,H) Sp 138/3, (F) Sp 138/4, (G) Sp 164/9. Scale in (A,D) in mm, in (H) in µm; same scale for (A-C).

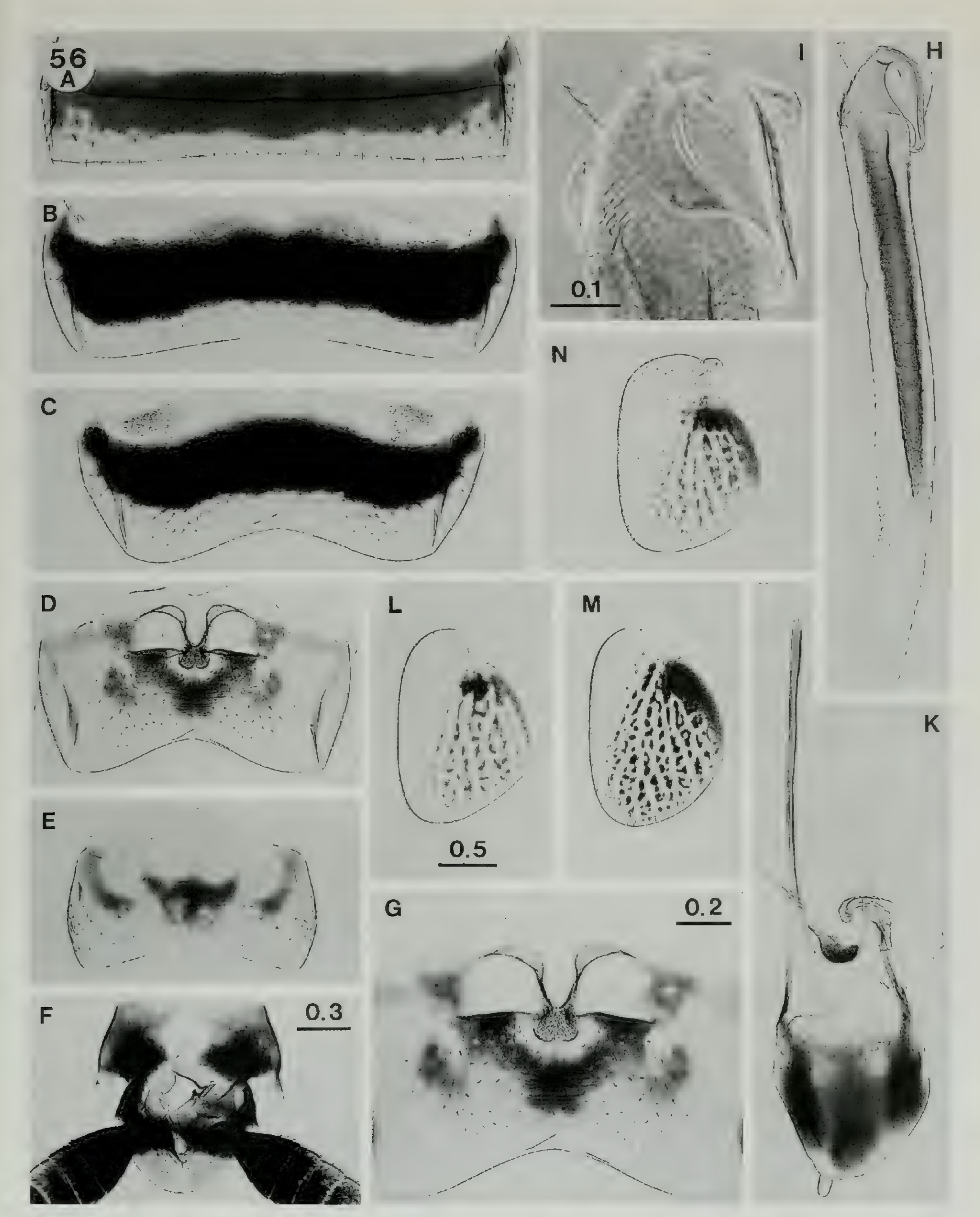



**Fig. 56.** *P. fernandesiana*, male (B-M), female (A,N). T5 (A,B), T6 (C), T7 (D; gland region: G), T8 (E), T9+10 (F), hook of left phallomere (H,I), subgenital plate (K), forewings (L-N). Identification: (A) Sp 138/7, (B-E,G-I) Sp 138/2 (Holotype), (F,K) Sp 329/1, (L) Sp 83/2, (M) Po 27/4, (N) Sp 138/6. Same scale (in mm) for (A,L-N), (B-F,K), and (G,H).

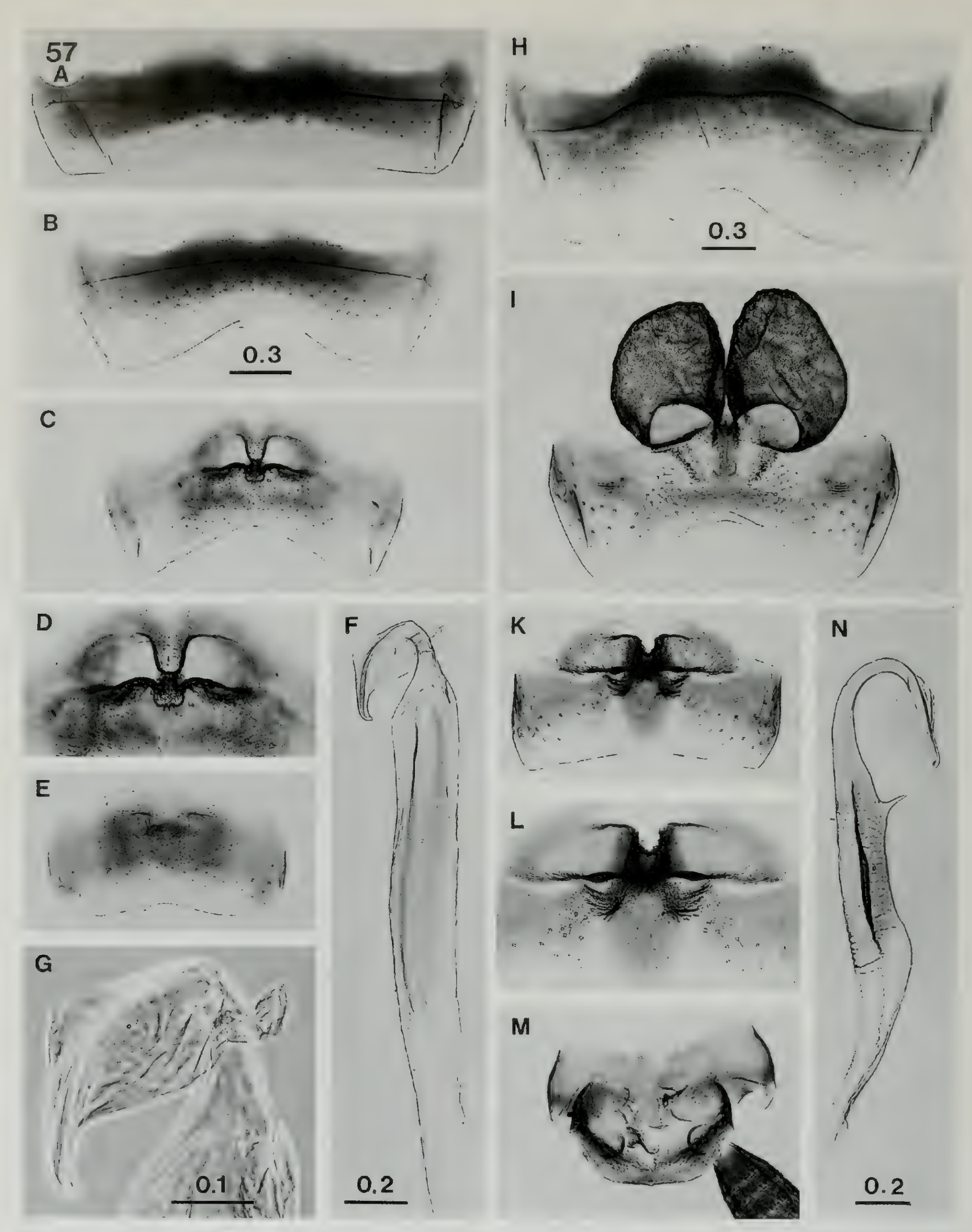



**Fig. 57.** (A-G) *P. carpetana*, holotype. T5 (A), T6 (B), T7 (C; gland region: D), T8 (E), hook of 'left' phallomere (G,F). (H-N) *P. sacarraoi*, holotype. T6 (H), T7 (I), T8 (K; gland region: L), T9+10 (M), hook of left phallomere (N). Same scale (in mm) for (A-C,E), (D,F), (H-K,M), and (L,N). – Photographs B and H are slightly underexposed in order to show the different shape of the transversal ridge on T6.

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## (Hymenoptera, Ichneumonoidea, Ichneumonidae)

Wolfgang Schwenke



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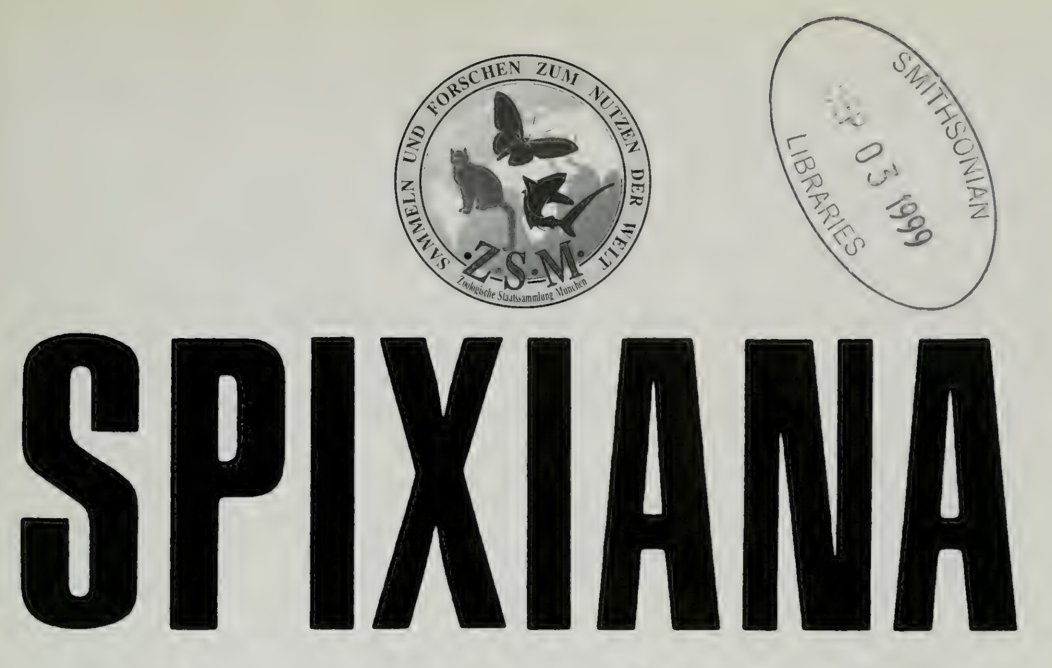
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# Revision der europäischen Mesochorinae

## (Hymenoptera, Ichneumonoidea, Ichneumonidae)

Wolfgang Schwenke

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# Revision der europäischen Mesochorinae

**(Hymenoptera, Ichneumonoidea, Ichneumonidae)**

**Wolfgang Schwenke**

Schwenke, W. (1999): Revision der europäischen Mesochorinae (Hymenoptera, Ichneumonoidea, Ichneumonidae). – Spixiana Suppl. **26:** 1-124

This is the first revision of European Mesochorinae since Schmiedeknecht (1910) who distinguished 4 genera and 87 species. The present revision contains 7 genera and 300 species of which 231 species are newly described. Contrary to other opinions, all 7 of the genera which have been established between 1829 and 1933 in Europe are upheld. The known facts demonstrate all of Mesochorinae species being hyper-(secundary) parasites of caterpillars of Lepidoptera (~60 %) or of larvae of Tenthredinoidea (~30 %) or of adults of Coleoptera (~10 %). As secundary hosts serve many species of Ichneumonoidea and Braconidae as well as some species of Tachinidae.

Prof. Dr. Wolfgang Schwenke, Brennerstraße 88, D-82194 Gröbenzell.

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## Einleitung

Die bislang einzige Revision der europäischen Arten der Schlupfwespen-Subfamilie Mesochorinae (Hymenoptera, Ichneumonoidea, Ichneumonidae) geht auf Schmiedeknecht (1910) zurück. Dieser charakterisierte die bekannten Arten, zog einige von ihnen ein und machte andere zu Varietäten, vermied jedoch jegliche Neubeschreibung. Seine Revision umfaßt 4 Gattungen mit 87 Arten. Von anderen Regionen revidierte Dasch (1971) die nearktischen (nordamerikanischen) sowie derselbe Autor (Dasch 1974) die neotropischen (süd- und mittelamerikanischen) Mesochorinae. In Nordamerika nördlich von Mexiko unterschied er 4 Gattungen mit 127 Arten, im südlich davon gelegenen Amerika 8 Gattungen mit 277 Arten.

Die hier vorgelegte Revision der europäischen Mesochorinae umfaßt 7 Gattungen mit 300 Arten (einschließlich je 1 Art aus den Randgebieten Marokko, Ägypten und Israel), von denen 231 Arten neu sind.

Wahl (1993) nennt die Mesochorinae eine kleine Subfamilie der Ichneumonidae mit etwa 600 beschriebenen Arten. Diese Zahl erhöht sich mit den Neubeschreibungen dieser Revision auf etwa 830 Arten.

## Terminologie, Maße, Kürzel

Die Terminologie der morphologischen Körpermerkmale folgt im wesentlichen jener von Townes (1969).

Für die Bestimmungsschlüssel und Artbeschreibungen wurden nur solche Merkmale verwendet, die einfach erkennbar sind und keine wesentliche Variabilität aufweisen. Daher blieben z.B. die sehr variablen Fühlermerkmale (Länge, Gliederzahl) unberücksichtigt. Auf absolute Meßwerte wurde – mit Ausnahme der Körperlänge – verzichtet. Die Maße wichtiger Körperteile wurden relativ, im Vergleich zu anderen Körperteilen gekennzeichnet, so z.B. die Länge des Legebohrers in Beziehung zur Länge des 1. Hintertarsus-Gliedes gesetzt.

Kürzel für Maße: < = kleiner als; > = größer als; ≤ = gleich groß oder kleiner; ≥ = gleich groß oder größer.

Als **Vertexbrücke** (Abb. 3) wird die Distanz zwischen Lateralocellus und Augenrand, bezogen auf den Durchmesser des Lateralocellus, bezeichnet.

Zum Beispiel heißt "Ocellus = 1.5 Vertexbrücke": der Lateralocellus ist 1.5 mal so breit wie die Entfernung zwischen Ocellus und Augenrand.

**Schläfe > Augenbreite** heißt: die Schläfenbreite bei senkrechtem Blick auf die Mitte des hinteren Augenrandes (Abb. 3) ist breiter als die Augenbreite in dieser Sicht. Hierbei werden Schläfen- und Augenbreite auf einer waagerechten Linie durch den Blickpunkt, ohne Rücksicht auf die Krümmungen von Auge und Schläfe, geschätzt.

**Wangenfurche** = vom Maxillus-Hinterrand zum unteren Augenrand verlaufende Furche (Abb. 6-8).

Die apikale Schwärzung oder Verdunklung der Tibia III bezieht sich auf die größte Ausdehnung an der Schienen-Außenseite.

Vespoid = Hell/Dunkel-Bänderung von mehreren aufeinanderfolgenden Tergiten.

Von den in der Literatur enthaltenen Wirtsangaben wurden nur die sicher erscheinenden übernommen.

Die Angabe eines Primärwirtes besteht im allgemeinen aus dem Gattungsnamen ohne Artname sowie dem in Klammer gesetzten Familiennamen; z.B. *Bupalus* (Geometridae). Die Primärwirt-Herkunft ist mit "ex", die Sekundärwirt-Herkunft mit "via" gekennzeichnet, z.B.: Ex *Bupalus* (Geometridae) via *Apanteles* (Braconidae).

Der Name des Informanten, der über eine Wirtsbeziehung informiert, ist der Wirtsangabe in Klammer, zumeist als Kürzel, beigefügt. Es bedeuten: (Aub.)ert, (Bau.)er, (Bign.)ell, (Brisch.)ke, (Cap.)ek, (Cress.)on, (Curt.)is, (Dan.)iel, (Del.)ucchi, (D.J.) De Jong, (D.T.) Dalla Torre, (Eich.)horn, (Fied.)ler, (B.d.F.) Boyer de Fonscolombe, (F.P.M.) F. P. Müller, (Füh.)rer, (Gir.)aud, (Hab.)ermehl, (Haes.)elbarth, (Haeuss.)ler, (Hal.)iday, (Hart.)ig, (Hed.)wig, (Hz.) Hinz, (Holm.)gren, (Horst.)mann, (Jä.)ckel, (Jod.)al, (Jourdh.)eul, (Kok.)ujew, (Kriech.)baumer, (No.)ack, (Pet.)ers, (Pfank.)uch, (Plan.)ica, (Psch.W.) Pschorn-Walcher, (Puhl.)mann, (Ra.)tti, (Ratz.)eburg, (Rin.)homäki, (Ryr.)holm, (Schmied.)eknecht, (Schw.)enke, (Str.)obl, (Szepl.)igeti, (Thoms.)on, (Thun.)berg, (Vid.)al, (Zah.)radnik, (Zett.)erstedt.

## Untersuchtes Material

Das Untersuchungsmaterial stammt aus folgenden Sammlungen: American Entom. Inst. (AEI), Gainsville/USA; Andrews, Sir Christopher, Salisbury/UK; Aubert, J. F., Lausanne/CH; Bachmeir, F. (†), München (ZSM = Zoolog. Staatssammlg. München)/D; C.A.B., Int. Inst. of Biol. Contr., Europ. Station, Delémont/CH; Cymorek, S. (†), Krefeld (Naturkd.-Museum, Krefeld)/D; Dt. Ent. Inst. (DEI), Eberswalde/D; Diller, E., München (ZSM)/D; Eichhorn, O., Heitersheim/D; Eidgen. Techn. Hochschule, Ent. Inst., Zürich/CH; European Paras. Labor., Orgerus-Behoust/F; Forschungsinst. Senckenberg, Frankfurt/M./D; Franz, J. (†), Darmstadt/D; Führer, E., Wien/A; Glavendekić, Milka, Belgrad/YU; Haeselbarth, E., Gauting (ZSM)/D; Hinz, R. (†), Einbeck (ZSM)/D; Horstmann, K., Würzburg/D; Inst. v. Plantenziekt. Onderzoek, Wageningen/NL; Jussila, R., Turku/SF; Landesmuseum Linz/A; Martinek, V., Strnady/CS; Mey, W., Inst. f. Pflanzenschutz, Eberswalde/D; Mus. Nat. History, Ent. Dept. Prag/CS; Naturhist. Riksmuseum, Ent. Avdel, Stockholm/S; Norwich Castle Museum, Norwich/UK; Oehlke, J., Eberswalde/D; Olafson, E., Naturufraedistofnun Islands/IL; Pagliano, G., Turin/I; Peters, G., Bonn/D; Pschorn-Walcher, H., Admont/A; Scaramozzino: L., Turin/I; Schwarz, M., Zwettl/A; Schwenke, W., Gröbenzell (ZSM)/D; Sedivý, J., Inst. of Plant Protection, Praha/CS; Seyrig, A., Paris (Mus. nat. hist. Paris)/F; Station Centr. Zool. (NRA), Versailles/F; Swedish Museum Nat. Hist., Dept. Ent., Stockholm/S; Szépligeti, V., Budapest (ungar. Nat. Mus. Budapest)/H; Univ. of Lund, Zool. Inst. Ent. Dept., Lund/S; Univ. of Uppsala, Zool. Inst. Ent. Dept., Uppsala/S; Zoerner, H., Dessau/D; Zoolog. Museum Univ., Berlin/D; ZSM/D; Zoologisk Mus. Kopenhagen/DK.

## Subfamilie Mesochorinae

**Diagnose.** Länge 2.0 mm *(Stictopisthus)* bis 19.0 mm *(Cidaphus)*; Clypeus nicht durch Grube vom Gesicht getrennt; Mandibeln mit 2 Zähnen; zwischen Mandibel-Basis und unterem Augenrand mit oder ohne Wangenfurche; Fühler fadenförmig mit 25-55 Gliedern, deren Zahl im Prinzip proportional der Körperlänge ist; apikaler Rand der Tibia I ohne Außenzahn; Klauen meist gezähnt; Areola gewöhnlich groß und rhombisch; Metanotum vollständig gefeldert; Abdomen ab Tergit 3 bis Apex etwas seitlich zusammengedrückt; Tergit 1 (Stiel) mit Luftlöchern nahe der Mitte; Legebohrer (Abb. 1) vorstehend, 2.5-13 mal so lang wie breit, meistens etwa so lang wie die Tibia III; ♀ Subgenitalplatte groß, in der Mitte gefaltet; ♂ Abdomenende mit zweizinkiger Gabel (Aftergriffel, Griffel) (Abb. 2).

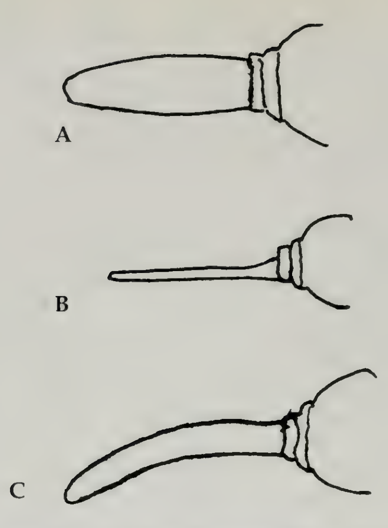



**Abb. 1.** Legebohrer von *Mesochorus*-Arten. **A.** *Mesochorus anthracinus* Kriechbaumer. **B.** *M. corvulus* Thomson. **C.** *M. curvicaudus* Thomson.

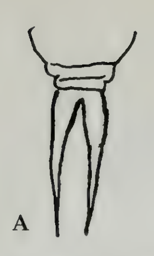
Die Hauptkennzeichen der Subfamilie Mesochorinae sind: die große rhombische Areola, die den rücklaufenden Nerv kurz vor oder in der Mitte aufnimmt, die zweizinkige Gabel (Aftergriffel) am Abdomenende des ♂ und die sekundärparasitische Lebensweise (s.u.).

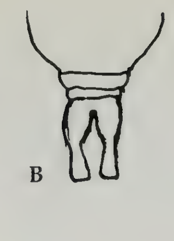
Die Larven der Mesochorinae (Short 1976) ähneln jenen der nahestehenden Subfamilien, vor allem der Ophioninae, doch sind ihre Kopfstrukturen stärker zurückgebildet.

Die bis dahin als Tribus Mesochorini der Ichneumonidae-Subfamilie Ophioninae betrachtete Gruppe wurde von Townes (1945, 1969) zur Subfamilie Mesochorinae erhoben und neben die Ophioninae gestellt.

Nachdem von den 7 zwischen 1829 und 1933 beschriebenen europäischen Mesochorinae-Gattungen die Gattung *Stictopisthus* Thomson, 1886 von Townes (1943) zu *Meochorus* Gravenhorst 1829 gestellt worden war und Townes et al. (1965) *Dolichochorus* Strobl, 1904 und *Mesochorella* Szépligeti, 1911 mit *Astiphromma* Förster, 1868 synonymiert hatten, zog Wahl (1993) auch noch *Plectochorus* Uchida, 1933 zu *Mesochorus*. Das zum wesentlichen Teil auf Larvenmerkmalen beruhende cladistische System von Wahl (1993) enthält somit nur noch 3 europäische Gattungen: *Mesochorus* Gravenhorst, 1829, *Cidaphus* Förster, 1868 und *Astiphromma* Förster, 1868.

Im Gegensatz dazu werden in der vorliegenden Revision alle 7 bisher in Europa beschriebenen Gattungen als eigenständig anerkannt. Ihre wichtigsten Unterscheidungsmerkmale sind im Gattungs-Schlüssel (S. 10) zusammengestellt. Wahl (1993) erkennt nur in den 3 genannten Gattungen "monophyletic groups" und bezeichnet alle anderen Gruppierungen als "Phantoms that hinder the efficency of classifications". Jedoch bildet die Klassifizierung der höheren Kategorien oberhalb der Gattungen nur die eine Seite der Systematik. Die andere Seite ist die Determination der Arten, die mit der Gruppierung von Arten zu Gattungen zusammenhängt. Die hier vorgelegte Revision steht im Dienste der Arten-Determination. Sie führt zur Erleichterung der Bestimmungsarbeit eine Artengruppierung innerhalb der Gattung ein, die drei hierarchische Stufen aufweist: 1. Abteilungen aufgrund wesentlicher biologischer Merkmale. 2. Sektionen aufgrund von Körperbau-Merkmalen. 3. Gruppen aufgrund von Farbmerkmalen. In diesem Sinne werden die 3 artenreichen Gattungen untergliedert: *Astiphromma* in 2 Sektionen und 2 Gruppen, *Stictophisthus* in 3 Sektionen und *Mesochorus* in 2 Abteilungen, 7 Sektionen und 7 Gruppen.





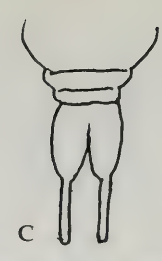



**Abb. 2.** Aftergriffel von Mesochorinae-Arten: **A.** *Mesochorus anthracinus* Kriechbaumer. **B.** *Astiphromma leucogrammum* Holmgren. **C.** *Mesochorus subfuscus*, spec. nov.

## Lebensweise und Verbreitung

Es wird in dieser Revision an dem alten Terminus "Parasit" festgehalten, da die neuere Bezeichnung "Parasitoid" ("Raubparasit", der seinen Wirt letztlich tötet) nicht eingebürgert ist.

Die Mesochorinae sind Sekundärparasiten (Hyperparasiten), die in primärparasitischen Schlupfwespen- oder Trachinen-Larven parasitieren, welche in nicht parasitischen Insekten (Primärwirten) schmarotzen. Bei der namentlichen Nennung der drei Partner ist die Reihenfolge: Hyperparasit ex Primärwirt via Primärparasit (Sekundärwirt), also z.B. *Mesochorus rubeculus* ex *Bupalus piniarius* (Geom.) via *Campoplex angustatus* (Ichn.).

In der Reihenfolge ihrer Häufigkeit treten als Primärwirte der Mesochorinae auf: Larven von Lepidoptera und Tenthredinoidea sowie Imagines von Coleoptera, als Sekundärwirte: Larven von Braconidae, Ichneumonidae und Tachinidae.

Muesebeck (1977) zählt auch einige Psocoptera und Heteroptera (Miridae) zu den Primärwirten von Mesochorinen, doch sind diese Angaben ungesichert und völlig unwahrscheinlich. Den einzigen konkreten Hinweis auf die primärparasitische Lebensweise einer Mesochorine findet sich bei Häussler (1940) für *Plectochorus iwatensis* Uchida als Primärparasit bei *Grapholita molesta*. Jedoch bezeichnet Wahl (1993) auch diese Angabe als unklar und nicht gesichert.

Interessant ist, daß Tachiniden als Sekundärwirte nur bei je einer kleinen Artengruppe der Gattungen *Astiphromma* und *Mesochorus* auftreten und daß diese beiden, im Mesochorinen-System weit auseinanderliegenden Artengruppen durch ein gemeinsames morphologisches Merkmal ausgezeichnet sind: einen Chitindorn auf dem Scutellum. Offensichtlich dient dieser zum Aufsprengen des Tachiniden-Tönnchens beim Schlüpfvorgang.

Rechnet man die gesichert erscheinenden Wirtsangaben hoch, ergibt sich, daß von den europäischen Mesochorinae-Arten rund 89 % Larven- (62 % Lepidoptera, 27 % Tenthredinoidea) und 11 % Adulten- (Coleoptera) Hyperparasiten sind. Nach derzeitigem Kenntnisstand hyperparasitieren alle europäischen Mesochorinae-Arten nur jeweils eine der drei Primärwirte-Gruppen. Man hätte vermuten können, daß manche Mesochorinen sowohl Schmetterlingsraupen als auch Blattwespenlarven hyperparasitieren. Dafür gibt es aber keinen Beleg.

Die meisten Arten der europäischen Mesochorinae sind nur in sehr geringer Individuenzahl, oft nur als Einzelexemplar, bekannt, so daß man diese Subfamilie insgesamt als "selten" einstufen muß. Mit Ausnahme von Schadinsekten-Massenvermehrungen spielt sie nur eine eng begrenzte Rolle in der Populationsdynamik der phytophagen Insekten. Zur Abschätzung dieser Rolle wurden 1986 und 1988 in zwei verschiedenen Laubmischwäldern bei München – außerhalb von Insekten-Massenvermehrungen – je 100 an Blättern haftende Schlupfwespen-(Primärparasiten-)Kokons gesammelt. Aus ihnen schlüpften 4 bzw. 7 Mesochorinen. Rechnet man (immer außerhalb von Massenvermehrungen) mit einer mittleren Primärparasitierung phytophager Larven, z.B. Raupen, von 10 %, so würde damit die Hyperparasitierung der Primärwirte durch Mesochorinen etwa 0,5 % betragen.

Wenn eine Mesochorinen-Art in größerer Anzahl gefangen wird, kann dies zwei Ursachen haben: Erstens die Massenvermehrung einer Insektenart, bei der sich auch der Hyperparasit "aufschaukeln" kann, oder zweitens die Polyphagie, die eine geringe Anzahl von Mesochorinen-Arten aufweist. So hyperparasitiert z.B. *Mesochorus vittator* Zett. Hunderte von Lepidopteren-Arten und kommt daher auch außerhalb von Massenvermehrungen in relativ großer Zahl vor.

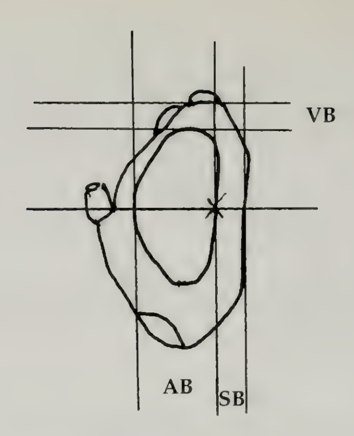



**Abb. 3.** Schema eines Mesochorinae-Kopfes in Seitenansicht. Bestimmung der Relationen Schläfenbreite (SB)/ Augenbreite (AB) sowie Ocellusbreite / Breite der Vertexbrücke (VB).

Über die Verbreitung der Mesochorinae in Europa ergibt sich noch kein klares Bild, da noch zu viele Gebiete zu wenig besammelt sind. Immerhin ist auffällig, daß die weitaus meisten Arten in Mittel- und Hochgebirgen sowie in mittel- und nordeuropäischen Regionen gefunden wurden. Aus den Mittelmeer-Ländern, zumindest aus deren südlichen Teilen, wurden bisher kaum Mesochorinen bekannt. Das spricht dafür, daß die Mesochorinae ihren Verbreitungsschwerpunkt in den nördlichen gemäßigten Breiten haben.

Die nordamerikanische und europäische Mesochorinen-Fauna berühren sich nur in wenigen Arten.

## Bestimmungstabelle der Gattungen

1(8) Gesicht ohne Wangenfurche

2(3) Ocellus 6- bis 8 mal so breit wie Vertexbrücke; Auge innen tief eingebuchtet (Abb. 4) ............ ............ 1. *Cidaphus* Förster (S. 11)

3(2) Ocellus max. 3 mal so breit wie Vertexbrücke; Auge innen nicht tief eingebuchtet

4(5) Kopf von vorn dreieckig; Nervellus ungebrochen ............ 2. *Dolichochorus* Strobl (S. 12)

5(4) Kopf nicht dreieckig; Nervellus fast immer gebrochen

6(7) Postpetiolus mit 2 Randleisten (Abb. 8); Tibia III innen konkav; ♂ mit schwarzem Gesicht; Primärwirte: Käfer-Imagines ............ 3. *Mesochorella* Szepligeti (S. 13)

7(6) Postpetiolus nur mit 1 Randleiste (Abb. 5); Tibia III innen gerade; ♂ mit gelbem Gesicht; Primärwirte: Schmetterlings- und Blattwespen-Larven ............ 4. *Astiphromma* Förster (S. 13)

8(1) Gesicht mit Wangenfurche

9(10) Abdomen ab Segment 2 messerförmig schmal; Propodeum bis Coxa-III-Ende verlängert (Abb. 6) ............ 5. *Plectochorus* Uchida (S. 25)

10(9) Abdomen nicht messerscharf; Propodeum nicht verlängert

11(12) Sutur vor dem Scutellum schmal, linienförmig; Fühler weiter von der Stirnmitte entfernt als vom Auge; Postpetiolus dicht längsrissig (Abb. 7) ............ 6. *Stictopisthus* Thomson (S. 26)

12(11) Sutur vor dem Scutellum breit, grubenförmig; Fühler nicht weiter von der Stirnmitte entfernt als vom Auge; Postpetiolus nicht dicht längsrissig (Abb. 8) ........ 7. *Mesochorus* Gravenhorst (S. 33)



**Abb. 4.** *Cidaphus thuringiacus* Brauns. Habitus seitlich; Kopf von vorn; Metathorax + 1. Gastersegment (Stiel) von oben. Verändert nach Townes (1971).

## Gattungs- und Artbeschreibungen

### 1. Genus *Cidaphus* Förster
Abb. 4

*Cidaphus* Förster, 1868: 149. Typus: *C. thuringiacus* Brauns, 1889; design. Viereck, 1914.
*Plesiophthalmus* Förster, 1868: 170. Name präokkupiert durch *Presiophthalmus* Motschoulski, 1858 (Dasch 1971: 7); syn. Moczár 1969: 1. Typus: *Mesochorus alarius* Gravenhorst, 1828.
*Mater* Schulz, 1911: 22. Nom. nov. für *Plesiophthalmus*.
*Ophthalmochorus* Roman, 1925. Nom. nov. für *Plesiophthalmus*.

**Diagnose.** Vertex stark verengt; Ocellen 6-8 × Vertexbrücke; Augen tief eingebuchtet; Gesicht ohne Wangenfurche; Stigma und Radialzelle sehr lang und schmal; Areola stark verschoben; Nervellus gebrochen; Klauen gekämmt; Tergite 2 und 3 länger als breit.

In Europa 3 Arten.

#### Bestimmungstabelle der Arten (♀♀ + ♂♂)

1(2) Mit durchgehender Facialorbiten-Furche;Bohrer bauchig, ca. 4,5 mal so lang wie breit (Abb. 4) .......... 1. *thuringiacus* Brauns (S. 11)

2(1) Ohne durchgehende Facialorbiten-Furche; Bohrer parallel, ca. 6 mal so lang wie breit

3(4) Gesicht ♀, ♂ schwarz; Areola lang gestielt; Griffel-Ende stumpf ..... 2. *potanini* Kokujev (S. 12)

4(3) Gesicht ♀, ♂ rot; Areola kurz gestielt; Griffel-Ende spitz ............ 3. *alarius* Gravenhorst (S. 12)

### 1.1. *Cidaphus thuringiacus* Brauns
Abb. 4

*Cidaphus thuringiacus* Brauns, 1889: 78, ♂.
*Plesiophthalmus thuringiacus,* Schmiedeknecht 1910: 1940, ♀♂.

**Diagnose.** ♀, ♂: 7-15 mm; Hauptmerkmale s. Artenschlüssel; Körper gelbrot; Mesoscutum mit braunen Wischen; Abdomen ab Segment 4 ± verdunkelt oder geschwärzt.

**Typen.** Verschollen.

Fundorte in Deutschland, Frankreich, Österreich, Italien, Mazedonien, N-Afrika.
Europa außer Norden; N-Afrika.

### 1.2. *Cidaphus potanini* Kokujew

*Cidaphus potanini* Kokujew, 1906: 166, ♀♂.
*Plesiophthalmus melanocephalus* Habermehl, 1909: 566, ♂; syn. Townes 1965: 1941.

**Diagnose.** ♀, ♂: 10-16 mm; Hauptmerkmale s. Artenschlüssel; Färbung wie *C. thuringiacus,* jedoch Gesicht ♀ ♂ schwarz.

**Typen.** Coll. Kokujew. – *C. (S.) melanocephalus* Habermehl. Holotypus: ♂, Wildw. Juli 04, Habermehl (Senck.).

Ex *Mamestra* (Noctuidae) via *Enicospilus* (Ichneumonidae) (Hz.).
Zahlreiche europäische Fundorte.
Europa außer Süden; bis Japan.

### 1.3. *Cidaphus alarius* (Gravenhorst)

*Mesochorus alarius* Gravenhorst, 1829: 977, ♂.
*Plesiophthalmus alarius,* Brischke 1880: 105, ♀♂.
*Cidaphus alarius,* Brauns 1889: 78, ♀♂.
*Mesochorus gigas* Kriechbaumer, 1897: 232, ♀; syn. Schmiedeknecht 1910: 1941.

**Diagnose.** ♀, ♂: 15-19 mm; Hauptmerkmale s. Artenschlüssel; Färbung wie *C. thuringiacus.*

**Typen.** Verschollen. – *Mesochorus gigas* Kriechbaumer. Holotypus: ♀, Meran, Lebenberg Nr. 97, 160, Kriechbaumer (ZSM).

Ex *Catocala* (Noctuidae) (Bri.).
Fundorte in Polen, Deutschland, Frankreich, N-Italien, Mazedonien.
M- und SE-Europa.

## 2. Genus *Dolichochorus* Strobl

*Dolichochorus* Strobl, 1902: 108.

**Diagnose.** Gattungsmerkmale s. Artbeschreibung. Nur eine Art, die wegen ihrer abweichenden Kopfform Gattungsstatus besitzt.

### *Dolichochorus longiceps* Strobl

*Dolichochorus longiceps* Strobl, 1902: 108, ♀.

**Diagnose.** ♀: 5.5 mm; Kopf von vorn dreieckig, Augen sehr kurz und breit, Wangen auffallend lang; Wangenfurchen fehlend; Ocellen sehr klein (0.5 Vertexbrücke); Schläfe etwas > Augenbreite; Nervellus ungebrochen; Tergit 1 dicht gerieft; Coxa III sehr groß; Hinterbeine extrem lang; Bohrer dünn, viel <

Tarsus III, 1, Ende aufgebogen; Gesicht gelb, mit 5 ein "W" bildenden schwarzen Flecken; Thorax und Abdomen schwarz; Tergit 2 apikal mit breitem gelbem Saum; Tergit-3-Mitte gelb; Coxa I, II weiß, Coxa III rot, seitlich schwarz; Tibia-III-Ende ⅓ schwarz.

**Typen.** Verschollen.

Einzelfunde in Schweden, Polen, Deutschland, England, Österreich, N-Italien.
N-, M- und W-Europa.

### 3. Genus *Mesochorella* Szepligeti

*Mesochorella* Szepligeti, 1911: 48.

**Diagnose.** Gattungsmerkmale s. Arbeschreibung. Nur eine Art, die durch fehlende Wangenfurche von *Mesochorus* sowie fehlende obere Stiel-Leiste und schwarzes Gesicht des ♂ von *Astiphromma* unterschieden ist. Einzige Nicht-*Mesochorus*-Art mit Käfern (Chrysomelidae) als Primärwirte.

#### *Mesochorella nigriceps* (Brischke)

*Mesochorus nigriceps* Brischke, 1880: 192♂.
*Astiphromma nigriceps*, Schmiedeknecht 1910: 1949, ♂.
*Mesochorella nigriceps*, Szepligeti 1911: 48, ♂.

**Diagnose.** ♀, ♂: 5.8-6 mm; Schläfe sehr breit (1.5 mal Augenbreite); Ocellen sehr klein (< ½ Vertexbrücke); Unterer Mandibelzahn > oberer; Kopf und Thorax grubig punktiert; Nervulus praefurkal; Klauen gekämmt; Tibia III innen auffällig konkav; Bohrer lang (Tarsus III, 1 + 2), breit, zum Ende stark verdünnt; Griffel = Tarsus III, 2, gleich breit bleibend. ♀ ♂ gleich gefärbt; Kopf und Thorax schwarz; Coxa I, II, III schwarz, mit roter Spitze; Tergit 1 schwarz; Tergit 2 und folgende rot, mit Verdunklungen.

**Typen.** Verschollen. ♀ und ♂, Berlin 22.7.47, F. P. Müller (DEI); 1♂, Danzig, Brischke.

Ex *Colaphellus sophiae* (Chrysomelidae) (Senfkäfer, an Cruciferen) (F.P.M.).
Polen, Deutschland.

### 4. Genus *Astiphromma* Förster
Abb. 5

*Astiphromma* Förster, 1868: 170.
*Demophorellus* Hedwig, 1955: 90/91, 378; syn. S. Dasch 1971: 14.

**Diagnose.** Stirn glatt und glänzend; Wangenfurche zwischen Auge und Mandibel-Basis fehlend; Nervulus meist postfurkal; Nervus parallelus meist aus der Mitte der Brachialzelle; Nervellus fast immer gebrochen: Postpetiolus mit unterer und oberer Seitenleiste; Gesicht schwarz oder gelb, beim ♂ stets gelb; Stirn stets schwarz.

#### Bestimmungstabelle der Sektionen und Gruppen

1(2) Scutellum mit aufrechter Spitze ........ Sektion 1. *dorsale* (S. 16)

2(1) Scutellum ohne Spitze

3(4) Postpetiolus in ganzer Länge dicht feinrissig ........ Sektion 2. *pictum* (S. 17)

4(3) Postpetiolus nicht so ........ Sektion 3. *splenium* (S. 18)

5(6) Gesicht ♀ gelb ........ Gruppe 3.1. *anale* (S. 18)

6(5) Gesicht ♀ schwarz ........ Gruppe 3.2. *varipes* (S. 20)

**Bestimmungstabelle der Arten (♀♀)**

1(4) Scutellum mit aufrechter Spitze ........ Sektion 1. *dorsale* (S. 16)

2(3) Mesopleuren schwach punktiert; Scheitel kaum eingeengt; Bohrer = Tarsus III ........ 1. *dorsale* Holmgren (S. 17)

3 (2) Mesopleuren stärker punktiert; Scheitel stark verengt; Bohrer < Tarsus III ........ 2. *granigerum* Thomson (S. 17)

4(1) Scutellum ohne aufrechte Spitze

5(10) Postpetiolus in ganzer Länge dicht feinrissig ........ Sektion 2. *pictum* (S. 17)

6(7) Postpetiolus sehr breit, Nervulus postfurkal ........ 3. *rimosum*, spec. nov. (S. 17)

7(6) Postpetiolus schmaler; Nervulus interstitial

8(9) Clypeus schwarz, mit weißen Ecken; Mesopleuren rot ........ 4. *pictum* Brischke (S. 17)

9(8) Clypeus gelbrot; Mesopleuren schwarz ........ 5. *luridum*, spec. nov. (S. 18)

10(5) Postpetiolus höchstens am Endrand mit einigen Rillen ........ Sektion 3. *splenium* (S. 18)

11(22) Gesicht gelb ........ Gruppe 3.1.*anale* (S. 18)

12(13) Schultern mit großem gelbem Hakenfleck ........ 6. *hamulum* Thomson (S. 18)

13(12) Schultern ohne Hakenfleck

14(15) Unterer Mandibelzahn > oberer ........ 7. *mandibulare* Thomson (S. 18)

15(14) Beide Mandibelzähne gleich

16(17) Mesopleuren schwarz ........ 8. *anale* Holmgren (S. 19)

17(16) Mesopleuren mehrfarbig

18(19) Mesopleuren 3- bis 4farbig: weiß, gelb, rot, (schwarz) in fleckiger Verteilung ........ 9. *simplex* Thomson (S. 19)

19(18) Mesopleuren 2farbig: oben schwarz, unten rot, scharf getrennt

20(21) Schläfe > Augenbreite, Stigma dunkelbraun ........ 10. *leucogrammum* Holmgren (S. 19)

21(20) Schläfe < Augenbreite, Stigma hyalinbraun ........ 11. *tenuicorne* Thomson (S. 19)

22(11) Gesicht schwarz ........ Gruppe 3.2. *varipes* (S. 20)

23(26) Clypeus gelbrot

24(25) Gelber Fleck über dem Clypeus ca. ⅔ der Gesichtslänge; Schläfe < Augenbreite ........ 12.*tridentatum*, spec. nov. (S. 20)

25(24) Weißer Fleck über dem Clypeus, ca. ⅓ der Gesichtslänge; Schläfe ≥ Augenbreite ........ 13. *dispersum*, spec. nov. (S. 20)

26(23) Clypeus schwarz

27(28) Tergite 4-7 rot ........ 14. *splenium* Curtis (S. 20)

28(27) Tergite 4-7 schwarz (und rot)

29(32) Coxa III (z.T.) geschwärzt

30(31) Bohrer stabförmig, Nervulus interstitial ........ 15. *nigrocoxatum* Srobl (S. 21)

31(30) Bohrer bauchig, Nervulus postfurkal ........ 16. *albitarse* Brischke (S. 21)

32(29) Coxa III rot, höchstens etwas gebräunt

33(34) Schläfe > Augenbreite .......... 17. *buccatum* Thomson (S. 22)

34(33) Schläfe ≤ Augenbreite

35(42) Stigma extrem schmal und lang; Radialzelle sehr lang und spitz

36(37) Femur III schwarz .......... 18. *varipes* Holmgren (S. 22)

37(36) Femur III rot

38(39) 5 mm; Bohrer fast spitz .......... 19. *italicum*, spec. nov. (S. 22)

39(38) 6-8 mm; Bohrer am Ende wenig verdünnt

40(41) Mesopleuren und Scutellum schwarz, Nervulus stark postfurkal .......... 20. *marginellum* Holmgren (S. 23)

41(40) Mesopleuren und Scutellum rot; Nervulus schwach postfurkal oder interstitial .......... 21. *scutellatum* Gravenhorst (S. 23)

42(35) Stigma und Radialzelle normal

43(46) Abdomen-Hinterhälfte vespoid

44(45) 6.5 mm; Mesopleuren dicht punktiert .......... 22. *consertum*, spec. nov. (S. 23)

45(44) 4.5 mm; Mesopleuren glatt .......... 23. *uliginosum*, spec. nov. (S. 23)

46(43) Abdomen-Hinterhälfte nicht vespoid

47(50) Clypeus ganz schwarz

48(49) Bohrer-Ende nicht verjüngt .......... 24. *contum*, spec. nov. (S. 24)

49(48) Bohrer-Ende stark verjüngt .......... 25. *diversum*, spec. nov. (S. 24)

50(47) Clypeus unten rot, oben schwarz

51(52) Tergit 3 mit gelber Zeichnung .......... 26. *barbatulum*, spec. nov. (S. 24)

52(51) Tergit 3 ganz schwarz .......... 27. *caecum*, spec. nov. (S. 24)

## Bestimmungstabelle der Arten (♂♂)

1(4) Scutellum mit aufrechter Spitze

2(3) Mesopleuren schwach punktiert; Vertex nicht eingeengt .......... 1. *dorsale* Holmgren (S. 16)

3(2) Mesopleuren ziemlich stark punktiert; Vertex eingeengt .......... 2. *granigerum* Thomson (S. 17)

4(1) Scutellum ohne aufrechte Spitze

5(10) Postpetiolus in ganzer Länge dicht feinrissig

6(7) Tergite 3 + 4 ausgedehnt rot .......... 3. *rimosum*, spec. nov. (S. 17)

7(6) Tergite 3 + 4 schwarz, apikal schmal weiß

8(9) Mesopleuren überwiegend rot .......... 4. *pictum* Brischke (S. 17)

9(8) Mesopleuren schwarz .......... 5. *luridum*, spec. nov. (S. 18)

10(5) Postpetiolus höchstens am Ende mit einigen Längsrillen

11(14) Unterer Mandibelzahn > oberer

12(13) 7 mm; Tergit 2 schwarz, mit roter Mitte ........................................ 7. *mandibulare* Thomson (S. 18)

13(12) 5-6 mm; Tergit 2 ganz schwarz ........................................................ 19 .*italicum*, spec. nov. (S. 22)

14(11) Beide Mandibelzähne gleich

15(20) Coxa III (überwiegend) schwarz

16(17) Griffel lang (= Tarsus III, 2 + ½ 3) ........................................................ 16. *albitarse* Brischke (S. 21)

17(16) Griffel kurz (= Tarsus III, 2)

18(19) Griffel-Ende blattförmig verbreitert ........................................ 10. *leucogrammum* Holmgren (S. 19)

19(18) Griffel-Ende nicht verbreitert ........................................................ 15. *nigrocoxatum* Strobl (S. 21)

20(15) Coxa III gelbrot

21(22) Schulter mit großem weißem Hakenfleck ........................................ 6. *hamulum* Thomson (S. 18)

22(21) Schulter ohne solchen Fleck

23(24) Femur III oberseits (braun-)schwarz ........................................ 18. *varipes* Holmgren (S. 22)

24(23) Femur II oberseits höchstens etwas gebräunt

25(26) Griffel sehr lang (Tarsus III, 2 + ½ 3) ........................................ 20. *marginellum* Holmgren (S. 23)

26(25) Griffel kürzer

27(34) Mesopleuren ganz oder teilweise rot

28(29) Mesopleuren zweifarbig schwarz-rot, mit scharfer Grenze ....... 11. *tenuicorne* Thomson (S. 19)

29 28) Mesopleuren anders gefärbt

30(31) Mesopleuren rot; Tergit 2 mit weißem Dreieck ........................................ 9. *simplex* Thomson (S. 19)

31(30) Färbung anders

32(33) Griffel ≤ Tarsus III, 2, gelb, Tarsi III hell ........................................ 14. *splenium* Curtis (S. 20)

33(32) Griffel > Tarsus III, 2, schwarz, Tarsi III geschwärzt ........... 21. *scutellatum* Gravenhorst (S. 23)

34(27) Mesopleuren schwarz

35(36) Schläfe > Augenbreite ........................................................ 17. *buccatum* Thomson (S. 22)

36(35) Schläfe ≤ Augenbreite

37(40) Postpetiolus glatt; Tergit 2 ohne Delle

38(39) Postpetiolus mit starker Einschnürung; Schläfe < Augenbreite ......... 8. *anale* Holmgren (S. 19)

39(38) Postpetiolus ohne starke Einschnürung; Schläfe = Augenbreite ........................................................ 25. *diversum*, spec. nov. (S. 24)

40(37) Postpetiolus mit Längsrillen; Tergit 2 mit großer Delle ................... 28. *laricis*, spec. nov. (S. 24)

**Sektion 1. *dorsale***

**Diagnose.** Scutellum mit aufrechter Spitze; Sekundärwirte: Tachinidae (einzige Ausnahme: *Astiphromma dorsale* hat außer Tachinidae auch *Meteorus albus* (Braconidae) als Sekundärwirt).

### 1. *Astiphromma dorsale* (Holmgren)

*Mesochorus dorsalis* Holmgren, 1858: 117, ♀♂.
*Mesochorus scutellatum* Brischke, 1880: 180, ♀; syn. Schmiedeknecht 1910: 1946.
*Mesochorus hirsutus* Bridgman, 1883: 168, ♀♂; syn. Schmiedeknecht 1910: 1947.
*Astiphrommus dorsalis*, Thomson 1885: 328, ♀♂.

**Diagnose.** ♀, ♂: 7.8-10 mm; Vertex kaum verengt; Mesopleuren schwach punktiert; Bohrer = Tarsus III, 1; Griffel > Tarsus III, 2. Thorax überwiegend schwarz; Abdomen schwarz, mit schmalen helleren Tergit-Endrändern; Tibia-III-Ende ⅕-⅙ geschwärzt.

**Typen.** Coll. Holmgren (Stockholm).

Bisher nur aus *Panolis flammea* (Noctuidae) via Tachinidae und – selten – *Meteorus albus* (Braconidae.) bekannt.
Fundorte: N-, M- und W-europäische Kiefernwälder, vor allem bei *Panolis*-Massenvermehrungen.
N-, M- und W-Europa.

### 2. *Astiphromma granigerum* Thomson

*Astiphromma graniger* Thomson, 1885: 328, ♀♂.

**Diagnose.** ♀, ♂: 5.5-8.2 mm; wie *A. dorsale*, aber i. M. kleiner und graziler; Vertex deutlich verengt; Mesopleuren stärker punktiert; Bohrer länger (> Tarsus III, 1) und schmaler; Tibia-III-Ende schmaler (1/7-1/8) schwarz.

**Typen.** Lectotypus: ♀, Hinz, 1962 (UZI Lund).

Ex *Alsophila* (Geometridae) und *Amphipyra* (Noctuidae) via Tachinidae (Hz., Schw.).
Schweden, Polen, Deutschland.
N- und M-Europa.

## Sektion 2. *pictum*

**Diagnosis.** Mesopleuren dicht punktiert; Postpetiolus stark längsrissig; Coxa III oben schwarz oder verdunkelt; Tergit-Endränder auffällig (schmal) weiß.

### 3. *Astiphromma rimosum*, spec. nov.

**Beschreibung.** ♀, ♂: 5.5-6 mm; s. o. Sektionsmerkmale; Schläfe > Augenbreite; Bohrer < Tarsus III, 1: Griffel = Tarsus III, 2, klobig; Gesicht gelb, mit schwarzem Fleck in der Gesichtsmitte; Thorax schwarz; Stigma hyalin; Coxa III mit 2 schwarzen Längsstreifen; Postpetiolus schwarz, bei ♀ mit roter Endhälfte; Tergit 2 rot, mit 2 schwarzen Beulen; Tergit 3 rot, mit schwarzen Seiten.

**Typen.** Holotypus: ♀, Dessau/D, 5 km NE, 13.5.88, *Alopecurus*-Wiese, H. Zoerner (DEI). – Paratypen: 2♀♀, Polen "Pa" und "Saw." (Warschau); 1♂, Dessau/D, H. Zoerner (DEI).

Polen, östl. Deutschland.

### 4. *Astiphromma pictum* (Brischke)

*Mesochorus pictus* Brischke, 1880: 186, ♂.
*Astiphromma incidens* Thomson, 1885: 365, ♀♂; syn. Schmiedeknecht 1910: 1952.
*Astiphromma pictum*, Schmiedeknecht 1910: 1952, ♀ ♂.

**Diagnosis.** ♀, ♂: 5.2-7.7 mm; s. o. Sektionsmerkmale; Schläfe > Augenbreite; Bohrer < Tarsus III, 1, bauchig; Griffel < Tarsus III, 2. Kopf schwarz, beim ♀ mit rotem Clypeus-Vorderrand und weißen Wangen, beim ♂ mit gelbem Gesicht und breiten gelben Orbiten bis zur Vertex-Hälfte; Prothorax und Mesopleuren überwiegend rot, mit schwarz und weiß; Mesoscutum rotbraun, mit gelber Zeichnung; Scutellum gelb; Abdomen schwarz, mit weißlichen, zum Abdomen-Ende zunehmend breiteren Tergit-Endrändern.

**Typen.** Verschollen.

Ex *Apethymus* (Tenthredinidae) (Hz.), *Periclista* (Tenthredinidae) (Psch.W.).
Funde in Polen, Deutschland, England, N-Frankreich.
M-Europa und England.

### 5. *Astiphromma luridum*, spec. nov.

**Beschreibung.** ♀, ♂: 5.1-5.7 mm; s. o. Sektionsmerkmale; wie *pictum*, aber: Schläfe = Augenbreite; Bohrer schmal, fast parallelseitig; Thorax ganz schwarz; Clypeus ♀ ganz rot; gelbe Orbiten des ♂ über den Fühlern nur kurz.

**Typen.** Holotypus: ♀, Wolfsegg a.H./Oberösterr., 15.5.87, M. Schwarz (Schwarz). – Paratypus 1♂, München/D an *Larix*, W. Schwenke (ZSM).

S-Deutschland, Österreich.

## Sektion 3. *splenium*

**Diagnose.** Ohne Merkmale der Sektionen 1 und 2.

## Gruppe 3.1. *anale*

**Diagnose.** Gesicht ♀ gelb.

### 6. *Astiphromma hamulum* Thomson

*Astiphromma hamulus* Thomson, 1885: 330, ♀♂.

**Diagnose.** ♀, ♂: 6 mm; Schläfe > Augenbreite; Bohrer = Tarsus III, 1; Griffel = Tarsus III, 2; Gesicht gelb; Thorax und Abdomen schwarz, Mesonotum mit je einem gelben Schulter-Hakenfleck; Mesosternum mit 2 gelben Längslinien.

**Typen.** Verschollen.

Fundorte in Dänemark, Deutschland, Spanien.
Europa.

### 7. *Astiphromma mandibulare* Thomson

*Astiphrommus mandibulare* Thomson, 1885: 330, ♀♂.

**Diagnose.** ♀, ♂: 7-9 mm; Schläfe < Augenbreite; Unterer Mandibelzahn > oberer; Stigma schmal; Bohrer = Tarsus III, 1; Griffel = Tarsus III, 2; Gesicht gelb, mit schwarzem Mittelstrich; Thorax schwarz; Stigma gelblich; Abdomen schwarz; Tergit 2 mit gelbem Dreieck bis zur Hälfte; Tergit 3 mit gelber sanduhrförmiger Zeichnung.

**Typen.** Lectotypus: ♀, Townes, Momoi & Townes 1965 (UZI Lund).
Ex Geom.-Raupe an *Vaccinium myrt.* (Haes.).

Fundorte in Schweden, Polen, Deutschland, Tschechien, Österreich.
N- und M-Europa.

### 8. *Astiphromma anale* (Holmgren)

*Meschochorus analis* Holmgren, 1858: 120, ♀♂.
*Astiphrommus analis,* Thomson 1885: 331, ♀♂.

**Diagnose.** ♀, ♂: 4.5-7 mm; Schläfe = Augenbreite; Bohrer = Tarsus III, 1; Griffel = Tarsus III, 2; Gesicht gelb; Thorax schwarz; Stigma hyalin-braun; Tibia-III-Ende ¼-⅓ verdunkelt; Abdomen schwarz; Tergit-2-Ende schmal gelbrot; die folgenden Tergite gelbrot, mit seitlichen Verdunklungen.

**Typen.** Coll. Holmgren (Stockholm).

Fundorte in Finnland, Schweden, Deutschland, Österreich, Schweizer Alpen.
N- und M-Europa.

### 9. *Astiphromma simplex* Thomson

*Astiphromma simplex* Thomson, 1885: 332, ♀♂.

**Diagnose.** ♀, ♂: 4.3-5.5 mm; Schläfe < Augenbreite; Nervellus ungebrochen; Tibia-III-Sporn sehr kurz (< ½ Tarsus III, 1); Bohrer < Tarsus III, 1; Griffel > Tarsus III, 2. Thorax schwarz; Prothorax überwiegend gelb; Mesopleuren 2- bis 4farbig (weiß, gelb, rot, schwarz) gefleckt; Stigma gelb-braun; Abdomen schwarz; Tergit-2-Endrand und Tergit-3-Seiten gelblich.

**Typen.** Lectotypus: ♀, Schwenke, 1968 (UZI Lund).

Ex *Semiothisa* (Geometridae) via *Apanteles* (Braconidae) (Fü.); ex *Enonomus* (Geometridae) via *Apanteles* (Braconidae) (Haes.).
Fundorte in Schweden, Polen, Deutschland, Österreich.
N- und M-Europa.

### 10. *Astiphromma leucogrammum* (Holmgren)

*Mesochorus leucogrammum* Holmgren, 1858: 121, ♀ ♂.
*Astiphrommus leucogrammus,* Thomson 1885: 331, ♀♂.

**Diagnose.** ♀, ♂: 4.0-5.7 mm; Schläfe > Augenbreite; Bohrer < Tarsus III, 1; Griffel = Tarsus III, 2, klobig, am Ende spatelförmig verbreitert (Abb. 2B); Prothorax rot; Meso- und Metathorax schwarz; Coxa III verdunkelt; Tergite schwarz, mit gelben Endrändern; Tergite 3 + 4 mit gelber Mittellinie.

**Typen.** Coll. Holmgren (Stockholm).

Ex *Eupithecia* 4 spp. (Geometridae) via *Meteorus, Rogas* (Braconidae) und *Campoplex* (Ichneumonidae) (Schmied.).
Fundorte in Schweden, Finnland, Polen, Deutschland.
N- und M-Europa.

### 11. *Astiphromma tenuicorne* Thomson

*Astiphrommus tenuicornis* Thomson, 1885: 332, ♀♂.

**Diagnose.** ♀, ♂: 5-7 mm; wie *leucogrammum*, aber: Schläfe schmaler (≤ Augenbreite), Bohrer länger (≥ Tarsus III, 1), Griffel schmal, nicht verbreitert, Stigma hyalin-braun, Coxae III hell, letzte Tergite fast ganz gelb.

**Typen.** Lectotypus: ♀, Hinz, 1962 (UZI Lund).

Ex *Monophadnus, Scobla, Pachynematus* (Tenthredinidae) (Hz., Cap.).
Fundorte in Schweden, Polen, Deutschland, Österreich, Tschechien, Bulgarien.
N-, M- und E-Europa.

### Gruppe 3.2. *varipes*

**Diagnose.** Gesicht ♀ schwarz.

### 12. *Astiphromma tridentatum*, spec. nov.

**Beschreibung.** ♀: 6 mm; Schläfe < Augenbreite; Gesichtsränder nach vorn divergierend; Bohrer = Tarsus III, 1 bauchig; Gesicht schwarz; über dem gelbroten Clypeus ein dreieckiger gelber Fleck bis ⅔ Gesichtshöhe; beiderseits des Clypeus ebensolcher Fleck bis ½ Gesichtshöhe; Thorax schwarz; Stigma hyalin-braun; Abdomen schwarz, 2. Tergit mit gelbem Endrand, 3. Tergit mit gelber Sanduhr-Zeichnung.

**Typen.** Holotypus: ♀, Rila-Kloster/Bulgar., E 232100/N 420900, 9.7.74, R. Hinz (ZSM).

Bulgarien.

### 13. *Astiphromma dispersum*, spec. nov.

**Beschreibung.** ♀: 5.5-6.5 mm; wie *tridentatum*, aber: Schläfe breiter (≥ Augenbreite); Gesichtsränder parallel; die 3 gelben Gesichtsflecken maximal ⅓ der Gesichtshöhe; 3. Tergit schwarz.

**Typen.** Holotypus: ♀, Kvikkjokk/S, 11.7.64, R. Hinz (ZSM). – Paratypen: 3♀♀, Helv., H. Pschorn-Walcher (Pschorn-Walcher); 2♀♀, Rogow/PL, J. Sawoniewicz, Huflejt (Warschau); 1♀, Hindelang/D; 1♀, Kiruna/S; 6♀♀, Courmayeur/I, alle R. Hinz (ZSM).

Ex *Pristiphora* (Tenthredinidae) (Psch.W.).
N- und M-Europa.

### 14. *Astiphromma splenium* (Curtis)

*Mesochorus splenium* Curtis, 1833: 424, ♂.
*Mesochorus sericans* Curtis, 1833: 424, ♀; syn. Stelfox, lt. Muesebeck 1977: 705.
*Mesochorus strenuus* Holmgren, 1858: 199, ♀♂; syn. Perkins 1976, lt. Muesebeck 1977: 705; überprüft von Townes 1977.
*Astiphromma plagiatum* Thomson, 1885: 329, ♂; **syn. nov.** nach Syntypus in CM Norwich (s.u.).

**Beschreibung.** ♀: 6.5-9.3 mm; Schläfe < Augenbreite; Stigma sehr schmal und lang; Radialzelle sehr lang und spitz; Bohrer < Tarsus III, 1; Griffel = Tarsus III, 2, dünn. ♀: Gesicht schwarz, mit rotem Vorderrand; Thorax schwarz, Prothorax und Scutellum partiell rot; Tibia-III-Ende ⅓ geschwärzt; Tergit 2 schwarz, mit gelbem Dreieck vom Endrand bis Mitte; ab Tergit 3 gelbrot, z.T. mit Verdunklungen.
♂ wie ♀, aber: Gesicht gelb, Prothorax gelb, Mesopleuren und Scutellum rot.

**Typen.** Holotypus verschollen. 2 Syntypen von *A. plagiatum* Thomson bekannt: a. 1♂, Skåne/S (UZI Lund), geprüft W. Schwenke; b. 1♂, coll. Bridgman (CM Norwich, lt. Fitton 1982, 549).

Ex *Eupithecia* (Geometridae), *Panolis* (Noctuidae), *Dasychira, Leucoma, Malacosoma* (Lymantriidae) via *Meteorus* (Braconidae), *Phobocampe* (Ichneumonidae) (Schw., Muesebeck 1977: 705).
Fundorte in allen Teilen Europas.
Eurasien, N-Amerika.

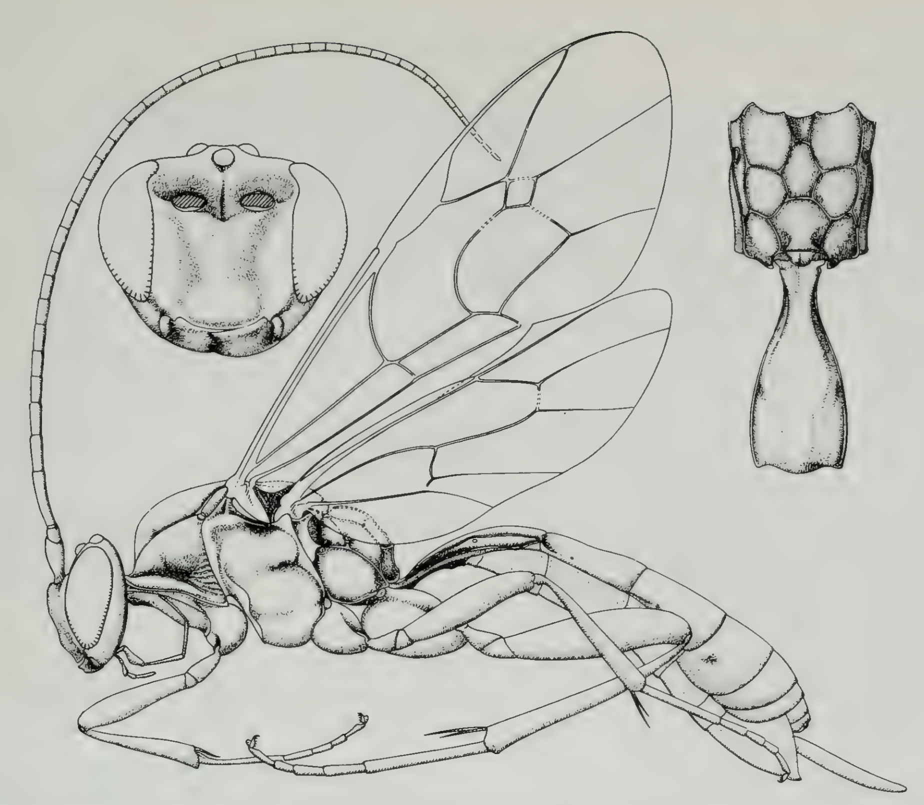


**Abb. 5.** *Astiphromma albitarse* Brischke. Habitus seitlich; Kopf von vorn; Metathorax + 1. Gastersegment (Stiel) von oben. Verändert nach Townes (1971).

### 15. *Astiphromma nigrocoxatum* Strobl

*Astiphromma anale* Holmgren var. *nigrocoxatum* Strobl, 1902: 103, ♂. *A. anale* und *nigrocoxatum* sind getrennte Arten (s. Nr. 8 + 15).
*Demophorellus mimulus* Hedwig, 1955: 379, ♂; **syn. nov.** nach Beschreibung.
*Astiphromma interstitiale* Constantineanu et Mustafa, 1969: 314, ♂; **syn. nov.** nach Beschreibung.

**Diagnose.** ♀ (neu), ♂: 5.0-6.5 mm; Schläfe = Augenbreite; Mesopleuren stark punktiert; Nervulus postfurkal oder interstitial; Bohrer schlank, > Tarsus III, 1; Gesicht, Coxae und Femora III schwarz; Tergit 2 schwarz, mit breitem gelbem Endrand.
♂ wie ♀, aber: Gesicht gelb, manchmal mit schwarzen Flecken; Griffel ≤ Tarsus III, 2, breit.

**Typen.** Verschollen.

Fundorte in österr. und deutschen Alpen, Schweizer Jura, Schwarzwald, Fläming.
Alpen und mitteleurop. Mittelgebirge.

### 16. *Astiphromma albitarse* (Brischke)
Abb. 5

*Mesochorus albitarsus* Brischke, 1880: 191, ♂.
*Astiphromma albitarse,* Schmiedeknecht 1910: 1957, ♂.
*Astiphromma nigrum* Pfankuch, 1921: 156, ♀; **syn. nov.** Synonym nach Holotypus s.u.
*Astiphromma heydeni* Habermehl, 1922: 270, ♀; **syn. nov.** nach Holotypus s.u.

Von *A. albitarse* sind nur ♂♂, von *A. nigrum* und *A. heydeni* nur ♀♀ bekannt. Sie bilden zusammen *A. albitarse* Brischke ♀♂.

**Diagnose.** ♀: 7.5-10.3 mm; Schläfe < Augenbreite; Stigma lang und schmal; Bohrer < Tarsus III, 1. Kopf, Thorax und Abdomen schwarz; Coxa III und Femur III schwarz; Tibia-III-Ende ca. ½ schwarz, Tarsi weißlich. Tergit-2-Endrand schmal, rot.

♂ wie ♀ aber: Gesicht gelb; Coxa III nur oberseits schwarz; Tibia-III-Ende nur ⅓ schwarz; Tergit-2-Ende ¼ gelb. Tergit-3-Mitte gelb; Griffel lang (Tarsus III, 2 + ½ 3).

**Typen.** Verschollen. – Holotypus: *A. nigrum* Pfank.: ♀, Bremen/D, 22.6.16 K. Pfankuch (ZSM). – Holotypus: *A. heydeni* Habermehl: ♀, Königsdorf/D, 1922, H. Habermehl (Senck.).

Fundorte in Polen, Deutschland, N-Frankreich.
M-Europa.

### 17. *Astiphromma buccatum* Thomson

*Astiphrommus buccatus* Thomson, 1885: 329, ♀ ♂.

**Diagnose.** ♀, ♂: 7-9 mm; Schläfe > Augenbreite; Mesopleuren dicht punktiert; Nervulus schwach postfurkal; Bohrer < Tarsus III, 1; Griffel = Tarsus III, 2. Thorax schwarz, beim ♂ schwarz und gelbrot; Tergit-2-Ende schmal, rot; Tergit-3-Mitte verwaschen rot.

**Typen.** Lectotypus: ♀, Schwenke 1968 (UZI Lund).

Ex *Lophyrus* und *Pachynematus* (Tenthredinidae) (Psch.W.).
Fundorte in Schweden, Polen, Deutschland, Frankreich, Spanien, Schweiz, Italien, Österreich.
Europa außer Osten.

### 18. *Astiphromma varipes* (Holmgren)

*Mesochorus varipes* Holmgren, 1858: 120, ♀.
*Astiphrommus varipes,* Thomson 1885: 329, ♀♂.

**Diagnose.** ♀, ♂: 7-9 mm; wie *marginellum,* aber: Schläfe schmaler (0.5-0.7 Augenbreite); Griffel kürzer (Tarsus III, 2 + ¼ 3), Femur III schwarz; ♂ Tergite 2 + 3 überwiegend rot.

**Typen.** Coll. Holmgren (Stockholm).

Ex *Bupalus* (Geometridae) via *Campoplex* (Ichneumonidae) (Schw.); ex *Panolis* (Noctuidae) via *Meteorus albidus* (Braconidae) (Schw.).
Fundorte: Kiefernwälder in Schweden, Polen, Deutschland, Österreich.
N- und M-Europa.

### 19. *Astiphromma italicum,* spec. nov.

**Beschreibung.** ♀: 4.7-5.5 mm; Schläfe = Augenbreite; Mesopleuren fein punktiert; Nervulus postfurkal, Nervellus gebrochen; Stigma schmal; Bohrer = Tarsus III, 1, schlank, am Ende stark verjüngt; Gesicht schwarz, über Mandibeln mit 2 roten Flecken; Thorax und Abdomen schwarz; Tibia-III-Ende ⅓ schwarz; Tergit-2-Ende schmal rot; Tergit-3-Mitte rötlich, Tergite 4 und folgende grau-braun.
♂ wie ♀, aber: Gesicht gelb-weiß; Tibia III Verdunklung undeutlich; Tergit 2 von Endrand bis Mitte mit gelbem Keil; Tergit 3 mit gelber Sanduhr-Zeichnung; Griffel = Tarsus III, 2.

**Typen.** Holotypus: ♀, Pizzighettone/I, 12.5.73, F. Frilli (AEI). – Paratypen: 2♀♀, 8♂♂, dto.

N-Italien.

### 20. *Astiphromma marginellum* (Holmgren)

*Mesochorus marginellus* Holmgren, 1858: 121, ♀♂.
*Astiphrommus marginellus,* Thomson 1885: 329, ♀♂.

**Diagnose.** ♀: 7.4-9.5 mm; Schläfe = Augenbreite; Mesopleuren fein punktiert; Stigma verschmälert; Radialzelle lang und spitz; Bohrer ≤ Tarsus III, 1; Gesicht schwarz, mit rotem Vorderrand; Körper schwarz; Tergit-2-Ende schmal rot; Tergit-3-Mitte mit rotem Fleck.
♂ wie ♀, aber: Gesicht gelb; Mesopleuren rot, gefleckt; Tergit 3 mit gelber Eieruhr-Zeichnung; Griffel lang (Tarsus III, 2 + ½ 3), zur Spitze verdünnt.

**Typen.** Coll. Holmgren (Stockholm).

Fundorte in Polen, Deutschland, Frankreich, Österreich.
M-Europa.

### 21. *Astiphromma scutellatum* (Gravenhorst)

*Mesochorus scutellatus* Gravenhorst, 1829: 973, ♂.
*Mesochorus scutellatus* Ratzeburg, 1848: 111, ♀; syn. Schmiedeknecht 1910: 1950.
*Mesochorus festivus* Holmgren, 1858: 121, ♀♂; syn. Schmiedeknecht 1910: 1950.
*Astiphrommus scutellatus* Thomson, 1885: 332, ♀♂; syn. Schmiedeknecht 1910: 1950.

**Diagnose.** ♀, ♂: 6-8 mm; wie *marginellum*, aber: Stigma und Radialzelle normal; Bohrer breiter; Nervulus interstitial oder schwach postfurkal; Mesopleuren rot und schwarz; Scutellum ± rot; Griffel etwas > Tarsus III, 2, viel dicker und kürzer als *A. marginellum.*

**Typen.** Verschollen. – Typen *M. festivus* Holmgren, coll. Holmgren ((Stockholm).

Ex *Diprion* (Tenthredinidae) (Hz., Schw.).
Fundorte in Schweden, Polen, Deutschland, Spanien.
Europa außer Osten.

### 22. *Astiphromma consertum*, spec. nov.

**Beschreibung.** ♀: 6 mm; Schläfe = Augenbreite; Mesopleuren dicht punktiert; Nervulus interstitial; Nervellus ungebrochen; Bohrer < Tarsus III, 1, breit; Kopf schwarz, über den Mandibeln je eine roter Fleck; Körper schwarz; Tergite 2 und folgende mit breiten gelben Endrändern (vespoid).

**Typen.** Holotypus: ♀, Leymen/Alsace/F, 6.60/4.61, F. Daniel (ZSM).

Ex *Periclista* (Tenthredinidae) (Dan.).
N-Frankreich.

### 23. *Astiphromma uliginosum*, spec. nov.

**Beschreibung.** ♀: 4.2 mm; Schläfe < Augenbreite; Mesopleuren glatt; Postpetiolus mit 3 Längsgruben; Bohrer = Tarsus III, 1, am Ende stark verjüngt; Körper schwarz; Tibia-III-Ende ⅓ schwarz; Tergit 2 mit rotem Dreieck von Ende bis Mitte; die folgenden Tergite vespoid.

**Typen.** Holotypus: ♀, Gröbenzell/D, Dachauer Moos, 7.91, W. Schwenke (ZSM).

Ex *Epione* (Geometridae) an *Salix* (Schw.).
S-Deutschland.

### 24. *Astiphromma contum*, spec. nov.

**Beschreibung.** ♀: 5 mm; Schläfe < Augenbreite; Mesopleuren fein punktiert; Nervulus postfurkal; Nervellus gebrochen; Stigma braun; Bohrer = Tarsus III, 1, schmal, stabförmig; Tibia-III-Ende ⅓ schwarz; Kopf und Körper schwarz; Tergit 2 mit schmalem gelbem Endband; Tergit 3 mit rötlicher Mitte.

**Typen.** Holotypus: ♀, Ovindoli/I, Dint. 23.6.88, A. Scaramozzino (Scaramozzino).

N-Italien.

### 25. *Astiphromma diversum*, spec. nov.

**Beschreibung.** ♀, ♂: 5.5-6.6 mm; Schläfe = Augenbreite; unterer Mandibelzahn > oberer; Mesopleuren fein punktiert; Bohrer = Tarsus III, 1, schlank, zum Ende stark verjüngt; Griffel schlank, etwas < Tarsus III, 2; Kopf und Körper schwarz; Tergit 2 Endrand gelb; Tergit 3 mit gelbroter Mitte, beim ♂ ausgedehnter als beim ♀.

**Typen.** Holotypus: ♀, Dessau/D, 4,4 km SW, 17.5.93, H. Zoerner (DEI). Paratypen: 1♀, Dessau/D (wie Typus); 1♂, Souzenboz/Schweizer Jura, H. Pschorn-Walcher (Pschorn-Walcher); 1♂, Iburg/D, R. Hinz (ZSM); 1♂, Dessau/D, H. Zoerner (DEI).

Ex *Pristiphora* (Tenthredinidae) via *Trematopygus* (Ichneumonidae) (Psch.W.).
Deutschland, Schweiz.

### 26. *Astiphromma barbatulum*, spec. nov.

**Beschreibung.** ♀: 4.8 mm; Schläfe = Augenbreite; Mesopleuren glatt; Bohrer = Tarsus III, 1, bauchig; Gesicht schwarz, mit breitem gelbem Vorderrand; Körper schwarz; Tergit-2-Ende breit, gelb; Tergit 3 mit gelber Eieruhr-Zeichnung.

**Typen.** Holotypus: ♀, Riva, Gardasee/I, 1.400 m, E. Haeselbarth (ZSM).

N-Italien.

### 27. *Astiphromma caecum*, spec. nov.

**Beschreibung.** ♀: 5.5 mm; von *barbatulum* verschieden durch: Mesopleuren dicht punktiert; Gesicht mit rotem Vorderrand; neben dem Clypeus je ein kleiner gelber runder Fleck; Tergit-2-Ende mit schmalem gelbem Saum.

**Typen.** Holotypus: ♀, It., VI, Ricoaro, Campogrosso, 1.500 m, 1.7.85, E. Haeselbarth (ZSM).

Italien. Alpen.

### 28. *Astiphromma laricis*, spec. nov.

**Beschreibung.** ♂: 5.1 mm; Schläfe = Augenbreite; Mesopleuren mäßig stark punktiert; Postpetiolus-Mitte längsgerunzelt; Tergit 2 mit großer Mittel-Delle; Griffel extrem kurz (< Tarsus III, 2); Gesicht und Wangen weiß-gelb, übriger Kopf sowie Körper schwarz; Stigma hyalin-braun; Tibia-III-Ende ca. ⅐ geschwärzt; Tergit-2-Ende schmal weiß-gelb; Tergit 3 mit gelber Sanduhr-Zeichnung.

**Typen.** Holotypus: ♂, 60 L 41 A, 1960, H. Pschorn-Walcher (Pschorn-Walcher).

Ex *Pristiphora* (Tenthredinidae) (Psch.W.).
M-Europa.



**Abb. 6.** *Plectochorus iwantensis* Uchida. Habitus seitlich; Kopf von vorn; Metathorax + 1. Gastersegment (Stiel) von oben. Verändert nach Townes (1971).

### 5. Genus *Plectochorus* Uchida

**Diagnose.** Nur eine Art, die besonders durch das messerförmige Abdomen und das stark verlängerte Propodeum gekennzeichnet ist (Abb. 6).

### *Plectochorus iwatensis* (Uchida)
Abb. 6

*Mesochorus iwatensis* Uchida, 1928: 262, ♀.
*Plectochorus iwatensis,* Uchida 1933: 163, 64, ♀.
*Plectochorus iwatensis,* Townes 1956: 259, ♀♂.

**Diagnose.** ♀, ♂: 4-5 mm; Gesicht stark quer, gewölbt; Fühler auffallend kurz; Mesopleuren stark punktiert; Propodeum (Epinotum) stark verlängert bis Ende der Coxa III; Nervulus stark postfurkal; Nervellus ungebrochen; Bohrer kurz und breit, zungenförmig, viel < Tarsus III, 1; Griffel = Tarsus III, 2; Gesicht gelbrot; Thorax rot, mit schwarzen Flecken; Stigma gelbweiß; Abdomen schwarz; Postpetiolus-Ende rot; Tergit-2-Mitte gelbrot; Tergit 3 gelb und braun gefleckt.

**Typen.** Holotypus: ♀, Iwate, Honshu, Sapporo/Japan, 1928, Uchida (Uchida). – Paratypen: 6♀♀, 2♂♂, 1933-1940 Japan, Uchida (Uchida); 1♀, Turku/F, 8.67 "am Fenster" (Jussila); 3♀♀, Udine/E-Italien, 8.85, Allegro (Scaramozzino).

Ex *Grapholita* (Tortricidae) (Uch.); ex *Gypsonoma* (Tortricidae) (All.).
Finnland, N-Italien, Japan.

## 6. Genus *Stictopisthus* Thomson
Abb. 7

*Stictopisthus* Thomson, 1885: 327.

**Genotypus:** *Mesochorus bilineatus* Thomson, desig. Viereck 1914.

**Diagnose.** Kleinste bis kleine Arten (2.0-5.5 mm); Antennen voneinander weiter entfernt als vom Augenrand; Schläfen breit (≥ Augenbreite), Ocellen klein (< Vertexbrücke); Scutellum-Grube schmal, eine Querrinne bildend; Areola sitzend; Nervulus postfurkal; Nervus parallelus unterhalb der Mitte der Brachial-Zelle; Nervellus ungebrochen; Postpetiolus dicht längsrissig. Die Arten dieser Gattung zeigen eine ± starke Abplattung des Pro- und Mesonotums, wodurch ihr Thorax, seitlich betrachtet, quadratisch bis rechteckig erscheint.

Primärwirte: Microlepidoptera.

### Bestimmungstabelle der Sektionen (auf ♀♀ bezogen)

1(2) Mesothorax bis Anfang der Coxa II bei seitlicher Aufsicht quadratisch, so lang wie hoch ...... ........ Sektion 1. *cuspidatus* (S. 28)

2(1) Mesothorax in dieser Betrachtung länger als hoch

3(4) Mesothorax in dieser Betrachtung 1¼- bis 1¾ mal so lang wie hochSektion 2. *formosus* (S. 28)

4 (3) Mesothorax in dieser Betrachtung ≥ 2 mal so lang wie hoch .......... Sektion 3. *unicinctor* (S. 31)

### Bestimmungstabelle der Arten (♀♀)

1(2) Mesothorax bis Anfang der Coxa II in seitlicher Aufsicht quadratisch; 2 mm, kleinste Art, Bohrer fast spitz ........ Sektion 1. – 1. *cuspidatus*, spec. nov. (S. 28)

2(1) Mesothorax in dieser Betrachtung rechteckig, länger als hoch

3(18) Mesothorax breit rechteckig (1¼-1¾ mal so lang wie hoch) ........ Sektion 2.

4(7) Mesonotum mit 2 gelben Längslinien, die Schultern umgreifend

5(6) Mesopleuren schwarz, normal lang ........ 2. *bilineatus* Thomson (S. 29)

6(5) Mesopleuren rot, nach hinten verlängert ........ 3. *maroccanus*, spec. nov. (S. 29)

7(4) Mesonotum ohne 2 gelbe Längslinien

8(9) Mandibeln und Gesicht aufgebläht; Stigma (überwieg.) hyalin ........ ........ 4. *macrocephalus* Strobl (S. 29)

9(8) Nicht diese Merkmals-Kombination

10(11) Gesicht geschwärzt oder verdunkelt ........ 5. *formosus* Bridgman (S. 29)

11(10) Gesicht hell

12(13) Bohrer fast spitz; Tergit 2 gelb ........ 6. *dilutus*, spec. nov. (S. 30)

13(12) Nicht diese Merkmals-Kombination

14(15) Femur III verdickt und verdunkelt ........ 7. *nemoralis*, spec. nov. (S. 30)

15(14) Femur III unverdickt und hell

16(17) Mesopleuren schwarz, Coxa III schwarz ........ 8. *sacromontis*, spec. nov. (S. 30)

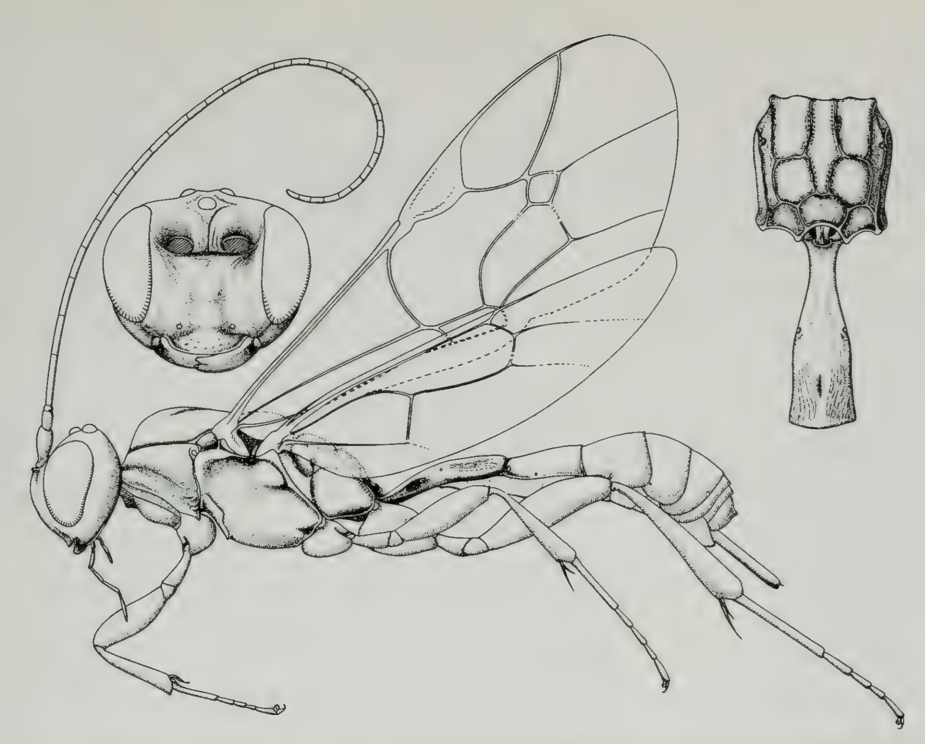


**Abb. 7.** *Stictopisthus* spec. Habitus seitlich; Kopf von vorn; Metathorax + 1. Gastersegment (Stiel) von oben. Verändert nach Townes (1971).

17(16) Mesopleuren (überwiegend) rot; Coxa III rot .......................... 9. *flavescens* Fonscolombe (S. 30)

18(3) Mesothorax schmal rechteckig, 2 mal so lang wie hoch) .............................................. Sektion 3.

19(20) Gesicht gewölbt; Sigma hyalin ...................................................... 10. *unicinctor* Thunberg (S. 31)

20(19) Gesicht normal; Stigma braun .................................................... 11. *madeirensis*, spec. nov. (S. 31)

**Bestimmungstabelle der Arten (♂♂)**

1(4) Griffel spitz

2(3) Hinteres Abdomendrittel vespoid; Griffel >Tarsus III, 2, dünner werdend ................................ ......................................................................................... 9. *flavescens* Fonscolombe (S. 30)

3(2) Hinteres Abdomendrittel schwarz; Griffel = Tarsus III, 2, gleich breit ....................................... ......................................................................................... 10. *unicinctor* Thunberg (S. 31)

4(1) Griffel stumpf

5(6) Mesonotum braun, mit 2 gelben, die Schultern umgreifenden Längsstreifen ............................ ......................................................................................... 2. *bilineatus* Thomson (S. 29)

6(5) Mesonotum ohne solche Streifen

7(8) Tergit 2 mehr als 2 mal so lang wie breit .................................. 12. *tenuigaster*, spec. nov. (S. 31)

8(7) Tergit 2 weniger als 2 mal so lang wie breit

9(10) ≥ 5 mm; Augenränder nach vorn divergierend ........ 4. *macrocephalus* Strobl (S. 29)

10(9) < 5 mm; Augenränder parallel

11(14) Stigma braun

12(13) Mesoscutum mit 2 nach hinten konvergierenden gelben Streifen ........ 11. *madeirensis*, spec. nov. (S. 31)

13(12) Mesoscutum ohne gelbe Streifen, in der Mitte umfangreich, rot 7. *nemoralis*, spec. nov. (S. 30)

14(11) Stigma (überwiegend) hyalin

15(16) Tergit 2 gelb ........ 13. *oranae*, spec. nov. (S. 32)

16(15) Tergit 2 z.T. schwarz

17(18) Tibia-III-Ende ⅓ schwarz ........ 14. *hispanicus*, spec. nov. (S. 32)

18(17) Tibia-III-Ende schmaler schwarz oder undeutlich verdunkelt

19(20) Stigma verbreitert ........ 15. *russicus*, spec. nov. (S. 32)

20(19) Stigma normal

21(22) Mesothorax, seitlich betrachtet, quadratisch ........ 16. *fraxini*, spec. nov. (S. 32)

22(21) Mesothorax rechteckig

23(24) Hinteres Abdomen-Drittel schwarz ........ 5. *formosus* Bridgman (S. 29)

24(23) Hinteres Abdomen-Drittel vespoid

25(26) Mesothorax, seitlich betrachtet, ca. 1.25 mal so lang wie hoch; Griffel = Tarsus III, 1 ........ 17. *polonius*, spec. nov. (S. 32)

26(25) Mesothorax, seitlich betrachtet, ca. 1.75 mal so lang wie hoch; Griffel > Tarsus III, 1 ........ 18. *moravius*, spec. nov. (S. 33)

## Sektion 1. *cuspidatus*

**Diagnose.** ♀ Mesothorax, seitlich betrachtet, quadratisch (so lang wie hoch).

### 1. *Stictopisthus cuspidatus*, spec. nov.

**Beschreibung.** ♀: 2.0 mm; Mesothorax bis Coxa II, seitlich betrachtet, quadratisch; Bohrer = Tarsus III, 1, schmal, fast spitz; Gesicht gebräunt; Mesopleuren oben rot, unten schwarz; Stigma hyalin; Tibia-II-Ende ⅙ schwarz; Abdomen schwarz, 2. Tergit apikale Hälfte rot.

**Typen.** Holotypus: ♀, La Cassa, Tor., Piem./I, 8.1992, A. Scaramozzino (Scaramozzino).

N-Italien.

## Sektion 2. *formosus*

**Diagnose.** ♀ Mesothorax, seitlich betrachtet, breit rechteckig (1¼- bis 1¾ mal so lang wie hoch).

### 2. *Stictophisthus bilineatus* Thomson

*Stictopisthus bilineatus* Thomson, 1885: 344, ♀♂.

**Diagnose.** ♀, ♂: 3.5 mm; Mesothorax ca. 1.5 mal so lang wie hoch; Bohrer = Tarsus III, 1; Griffel dünn, = Tarsus III, 2. Thorax schwarz(-braun); Mesonotum mit 2 auffälligen gelben Längsstreifen, die Schultern umgreifend; Stigma hyalin-braun; Coxa III verdunkelt; Abdomen schwarz; Tergit 2 ab Mitte gelb, Tergit 3 bis Mitte gelb (♀) oder ganz gelb (♂).

**Typen.** Lectotypus: ♀, Schwenke, 1968 (UZI Lund).

Fundorte in Schweden, Deutschland, Niederlande, Frankreich, Italien, Spanien.
N-, M- und S-Europa.

### 3. *Stictopisthus maroccanus*, spec. nov.

**Beschreibung.** ♀: 3 mm; wie *bilineatus*, aber: Mesopleuren bis Mitte Metathorax verlängert; Prothorax und Mesopleuren rot, übriger Thorax braun; die 2 gelben Streifen etwas blasser.

**Typen.** Holotypus: ♀, Maroc, Dariet Aoua, 20.7.58 (AEI).

Marokko.

### 4. *Stictopisthus macrocephalus* Strobl

*Stictopisthus macrocephalus* Strobl, 1902: 106, ♂.

**Diagnose.** ♀, ♂: 5-5.5 mm; Schläfe > Augenbreite, stark gewölbt; Gesicht und Mandibeln aufgebläht; Thorax (seitlich gesehen) ausgeprägt kastenförmig; Mesothorax ca. 1¾ mal so lang wie hoch; Bohrer kurz, ca. ½ Tarsus III, 1; Griffel lang und dünn (= Tarsus III, 2 + ½ 3). Prothorax gelbrot; Mesopleuren gelb- und dunkelrot; Mesonotum schwarz, mit 2 roten Längsstreifen; Coxa III schwarz; Tibia-III-Ende ¼-⅕ geschwärzt; Stigma (überwiegend) hyalin; Abdomen schwarz; Tergit-2-Ende ⅕ gelb; Tergit 3 Anfang ⅕ rot, mit roter Lasche bis ⅔.

**Typen.** Lectotypus: ♂, Schwenke 1969 (coll. Strobl) (Admont).-1♀, Blankenburg/D, O. Schmiedeknecht (ZSM); 1♀, Göttingen, R. Hinz (ZSM); 1♀, Banska Stavnica/ČSFR, A. Capek (Capek).

Ex *Ancylis* (Tortricidae) via *Apanteles* (Braconidae) (Cap.).
Fundorte in Deutschland, Tschechien, Österreich.
M-Europa.

### 5. *Stictopisthus formosus* (Bridgman)

*Mesochorus formosus* Bridgman, 1882: 154, ♀♂.
*Mesochorus convexicollis* Thomson, 1885: 344, ♀♂; **syn. nov.** nach Lectotypus.
*Stictopisthus formosus*, Schmiedeknecht 1910: 2008, ♀♂.

**Diagnose.** ♀, ♂: 2.5-3.3 mm; Mesothorax ca. 1½ mal so lang wie hoch; Bohrer = Tarsus III, 1; Griffel = Tarsus III, 2 + ¼ 3; Gesicht verdunkelt; Thorax schwarz, mit rötlicher Mesoscutum-Makel; ♂ rot, nur Metathorax braun; Stigma hyalin-braun; Tibia-III-Ende ⅕ verdunkelt; Coxa III verdunkelt; Abdomen schwarz; Tergit 2 mit ⅓ gelber Endbinde: Tergit 3 mit ½ gelber Basalbinde.

**Typen.** Verschollen. – *Mesochorus convexicollis* Thomson: Lectotypus: ♀, Schwenke 1968 (UZI Lund).

Ex *Lithocolletis* (Gracillariidae) (Schw.).
Fundorte: Schweden, Polen, Deutschland, Tschechien, Österreich, N-Italien.
N- und M-Europa.

### 6. *Stictopisthus dilutus*, spec. nov.

**Beschreibung.** ♀: 2.8 mm; Thorax ausgeprägt kastenförmig; Mesothorax ca. 1.5 mal so lang wie hoch; Stigma verbreitert; Bohrer > Tarsus III, 1, dünn fast spitz; Thorax schwarz, mit rötlicher Mesoscutum-Makel; Stigma hyalin; Coxa III verdunkelt; Tibia-III-Ende ⅕ geschwärzt; Tergit-1-Ende rot; Tergite 2 + 3 rot, mit seitlicher Trübung, ab Tergit 4 verschwommen vespoid.

**Typen.** Holotypus: ♀, Cukorova/Türkei 1./2.34, *Citrus*, Acatay (coll. Schwenke) (ZSM).

Türkei.

### 7. *Stictopisthus nemoralis*, spec. nov.

**Beschreibung.** ♀, ♂: 3.7-4.4 mm; Thorax ausgeprägt kastenförmig; Mesothorax 1¾ mal so lang wie hoch; Stigma verbreitert; Femur III verdickt; Bohrer < Tarsus III, 1, dick; Thorax schwarz, mit brauner Mesoscutum-Makel; Stigma schwarzbraun; Coxa III geschwärzt; Femur III stark gebräunt; Tibia-III-Ende ¼ schwarz; Abdomen schwarz; Tergit 2 mit ⅓ gelbem Endband; Tergit 3 mit ½ gelbem Basalband.

♂ wie ♀, aber: Thorax-Seite, Mesoscutum-Mitte, Scutellum und Coxa III rot; Femur III nur schwach gebräunt; Abdomen ab Tergit 3 vespoid; Griffel lang und dünn, = Tarsus III, 2 + 3.

**Typen.** Holotypus: ♀, Dessau/D, 4 km SW-SSW, 18.5.93, Nr. 100/93, H. Zoerner (DEI). – Paratypen: 5♂♂, Dessau, dto.

Deutschland.

### 8. *Stictopisthus sacromontis*, spec. nov.

**Beschreibung.** ♀: 2.8-3 mm; Thorax ausgeprägt kastenförmig, Mesothorax 1.5 mal so lang wie hoch; Bohrer dünn, = Tarsus III, 1; Thorax schwarz, Mesoscutum-Mitte und Scutellum-Seiten rot; Stigma braun; Coxa III schwarz; Tibia-III-Ende undeutlich verdunkelt; Abdomen schwarz, 1. Tergit Ende rot, 2. Tergit Ende ¼ gelb; 3. Tergit überwiegend rot.

**Typen.** Holotypus: ♀, Sacro Monte di Crea, AL, Piem./I, 29.7.86, A. Scaramozzino (Scaramozzino). – Paratypen: 2♀♀, Ital. VT, Lago Vico Caprarola (Scaramozzino).

N-Italien.

### 9. *Stictopisthus flavescens* (Boyer de Fonscolombe)

*Mesochorus flavescens* Boyer de Fonscolombe, 1852: 434, ♂.
*Stictopisthus flavescens*, Dalla Torre 1901: 54, ♂.

**Diagnose.** ♂: 3.4 mm; Thorax ausgeprägt kastenförmig; Griffel = Tarsus III, 2 + ¼ 3, dünner werdend; Thorax gelbrot; Mesonotum mit braunen Wischen; Metanotum basal ⅔ schwarz; Stigma schmutzig-hyalin; Abdomen schwarz(-braun), 1. Tergit mit roter Basis, 2. Tergit Ende mit ⅓ gelbem Band: folgende Tergite undeutlich vespoid.

♀: 3.6 mm; Mesothorax ca. 1.6 mal so lang wie hoch; Bohrer = Tarsus III, 1. Färbung wie ♂, aber: Prothorax und Mesopleuren rot, mit Verdunklungen; Mesoscutum schwarzbraun, mit helleren Wischen; Metanotum schwarz: Tergite 1 und 2 mit schmalen gelben Endbändern.

**Typen.** Holotypus: ♂, coll. Boyer de Fonscolombe (Paris). – 5♀♀, Leicester/UK, Owen (AEI); 1♀, Dessau-Wörlitz/D, H. Zoerner (DEI);1♂, ČSFR, 6.44, Vicitil (ZSM).

Fundorte in England, Frankreich, Deutschland, Tschechien.
M- und W-Europa.

## Sektion 3. *unicinctor*

**Diagnose.** ♀ Mesothorax ≥ 2 mal so lang wie hoch (schmal rechteckig).

### 10. *Stictopisthus unicinctor* (Thunberg)

*Cryptus (Mesochorus) unicinctor* Thunberg, 1824: 315, ♂; überprüft von Roman s.u.
*Cryptus (Mesochorus) complanatus* Haliday, 1839: 114♀; **syn. nov.** nach Beschreibungen *unicinctor* Thun. b. Roman 1912 sowie *complanatus* Hal. b. Schmiedeknecht 1910.
*Mesochorus tipularis* Ratzeburg, 1852: 120, ♀; syn. Schmiedeknecht 1910: 2006.
*Mesochorus complanatus,* Holmgren 1858: 131, ♀♂; syn. Schmiedeknecht 1910: 2006.
*Mesochorus aciculatus* Bridgman, 1882: 162, ♀♂; syn. Aubert 1965.
*Stictopisthus aciculatus* Thomson, 1885: 344, ♀♂; syn. Schmiedeknecht 1910, 2007.
*Stictopisthus laticeps* Thomson, 1885: 344, ♀♂; syn. Roman 1912, 292.

**Diagnose.** ♀: 3-4 mm; Thorax ausgeprägt kastenförmig; Mesothorax ≥ 2 mal so lang wie hoch; Bohrer = Tarsus III, 1. Thorax schwarz; Mesoscutum mit undeutlicher roter Makel; Stigma hyalin(-braun); Coxa III verdunkelt; Tergit 2 ⅔ schwarz, ⅓ rot; Tergit 3 fast ganz rot; ab Tergit 4 vespoid.
♂: Aftergriffel = Tarsus III, 2. Länge und Färbung wie ♀, aber: Prothorax sowie Pro-, Meso- und Metapleuren rot; Metanotum apikal rot.

**Typen.** Holotypus: ♂, überprüft von Roman 1912, 287 (UZI Lund); dort 1968 nicht mehr aufgefunden. – *S. laticeps* Thomson: Lectotypus: ♀, Schwenke 1968 (UZI Lund).

Ex *Lithocolletis* (Gracillariidae) (Schw.). Ex *Tortrix* (Tortricidae) via *Microgaster* (Braconidae) (Fü.).
Europa.

### 11. *Stictopisthus madeirensis,* spec. nov.

**Beschreibung.** ♀: 3 mm; Gesicht etwas gewölbt; Thorax ausgeprägt kastenförmig; Mesothorax = 2 mal so lang wie hoch; Stigma kurz und breit; Bohrer = Tarsus III, 1; Gesicht gebräunt; Thorax-Seiten rot; Mesoscutum braun, mit 2 unscharfen hellen Längsstreifen; Metanotum basal schwarz, apikal rot; Stigma dunkelbraun; Coxa III schwarzbraun; Tibia-III-Ende ¼ schwarz; Abdomen schwarz; Tergit 2 mit ⅓ gelbem Endrand, in der Mitte dreieckig hochgezogen; Tergit 3 apikale Hälfte gelbrot.
♂: Griffel dünn, etwas > Tarsus III, 2; sonst wie ♀, aber: Mesothorax nur 1½ mal so lang wie hoch.

**Typen.** Holotypus: ♀, Madeira, Machico/P, 5.82, Vidal (Vidal). – Paratypus: 1♂, dto.

Ex *Palpita* (Pyralidae) via *Chocyas* (Braconidae) (Vid.).
Madeira/Portugal.

### 12. *Stictopisthus tenuigaster,* spec. nov.

**Beschreibung.** ♂: 4 mm; Schläfe < Augenbreite; Mesothorax 1¼ mal so lang wie hoch; Griffel = Tarsus III, 2; auffällig lang-schmales 2. Tergit (Länge > 2 mal Breite), auch Tergit 3 länger als breit; Griffel = Tarsus III, 2; Thorax gelbrot, mit braun-schwarzen Mesonotum-Seiten und Metanotum-Basis. Tibia-III-Ende ⅕ geschwärzt; Abdomen schwarz (Tergit 1 basal) – weiß (Tergit 1 apikal bis Tergit 3 basal) – schwarz (Tergit 3 apikal) – rot (folgende Tergite).

**Typen.** Holotypus: ♂, München/D, 5.6.69, W. Schwenke (ZSM). – Paratypen: 2♂♂, Dessau/D, H. Zoerner (DEI).

Via Braconidae. Kokon an *Crataegus* (Schw.).
Deutschland.

### 13. *Stictopisthus oranae*, spec. nov.

**Beschreibung.** ♂: 2.8 mm; wie *tenuigaster*, aber: Schläfe = Augenbreite; Tergite 2 + 3 breiter als lang; Tergit 1 basal rot, apikal breit weiß; Tergit 3 apikale Hälfte und anschließende Tergite schwarz(-braun); Abdomen-Färbung somit: rot-schwarz-weiß-schwarz.

**Typen.** Holotypus: ♂, Serooskerke/NL, 24.8.67, De Jong (De Jong).

Ex *Adoxophyes orana* (Tortricidae.) (D.J.).
Niederlande.

### 14. *Stictopisthus hispanicus*, spec. nov.

**Beschreibung.** ♂: 3 mm; Schläfe > Augenbreite; Mesothorax 1.5 mal so lang wie hoch; Griffel lang, > Tarsus III, 2; Färbung wie *oranae*, aber: Tergit 1 schwarz; Tergite 4 und folgende vespoid; Tibia-III-Ende ¼ geschwärzt.

**Typen.** Holotypus: ♂, El Soldado, Sierra Morena/E, 26.7.26, Seyrig (Paris); (ohne Flügel; Kopf und Thorax genadelt, Abdomen geklebt).

Spanien.

### 15. *Stictopisthus russicus*, spec. nov.

**Beschreibung.** ♂: 4 mm; wie *hispanicus*, aber: Thorax ausgeprägt kastenförmig; Stigma verbreitert; Griffel kürzer, = Tarsus III, 2; Tergit 2 Apikal-Hälfte gelb bogenförmig; Tibia III hell.

**Typen.** Holotypus: ♂, Kishinev/Rußland, 6.08., Talitzkij (Moskau).

Europa. Rußland.

### 16. *Stictopisthus fraxini*, spec. nov.

**Beschreibung.** ♂: 2.8 mm; Schläfe < Augenbreite; Mesothorax so lang wie hoch; Griffel = Tarsus III, 2. Thorax gelbrot, mit schwarzbrauner Mesoscutum-Mittelmakel und schwarzbraunen basalen ⅔ des Metanotums; Tibia-III-Ende undeutlich verdunkelt; Abdomen schwarzbraun, Tergit-1-Basis rot; Tergit 2 mit ¼ gelbem Endrand; Basalhälfte des Tergits 3 gelb; letztes Tergit gelblich.

**Typen.** Holotypus: ♂, Harrlach, N-Bay./D, 17.7.72, an *Fraxinus*, W. Schwenke (ZSM).

Deutschland.

### 17. *Stictopisthus polonius*, spec. nov.

**Beschreibung.** ♂: 3 mm; Schläfe < Augenbreite; Mesothorax 1¼ mal so lang wie hoch; Griffel = Tarsus III, 2; Thorax Oberseite schwarz, Mesoscutum mit 2 roten Längswischen; Thorax-Seite rot-gelb; Tergit 1 schwarz, mit roter Basis; Tergit 2 schwarz, mit ⅕ gelbem Endrand; Tergit 3 fast völlig gelb; folgende Tergite rötlich-vespoid.

**Typen.** Holotypus: ♂, Polen, Nr. 399 (Warschau).

Polen.

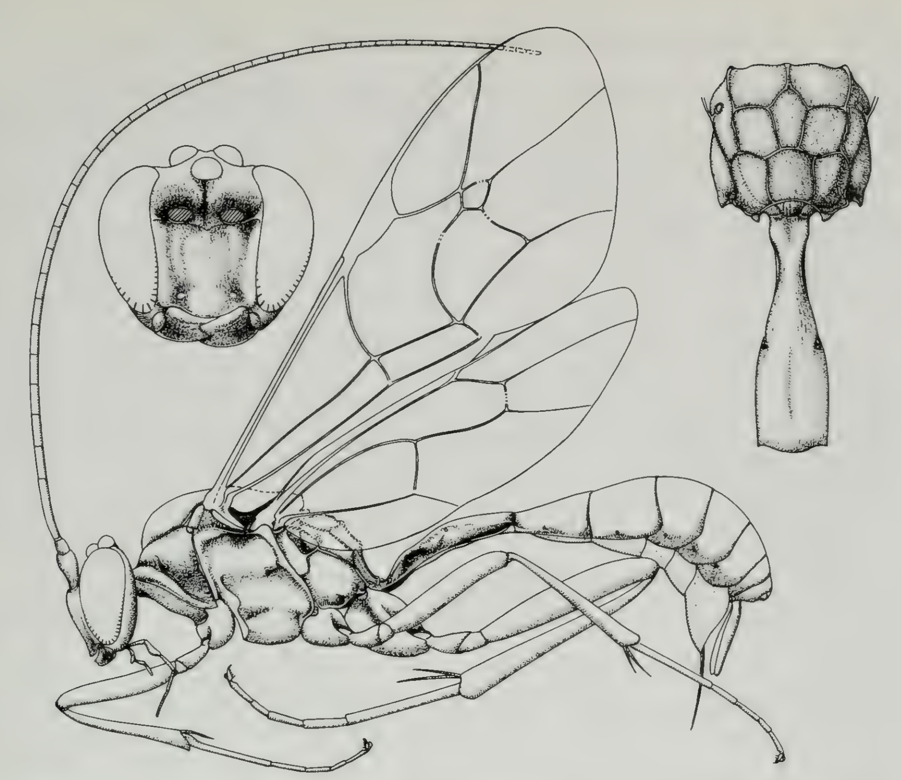


**Abb. 8.** *Mesochorus* spec. Habitus seitlich; Kopf von vorn; Metathroax + 1. Gastersegment von oben. Verändert nach Townes (1971).

### 18. *Stictopisthus moravius*, spec. nov.

**Beschreibung.** ♂: 3.4 mm; Schläfe = Augenbreite; Thorax ausgeprägt kastenförmig; Mesothorax = 1¾ mal so lang wie hoch; Griffel lang, Tarsus III, 2 + ½ 3; Thorax rot, mit Verdunklungen auf Mesonotum und basalem Metanotum; 1. Tergit schwarz; 2. Tergit schwarz, mit gelber Apikal-Hälfte; 3. Tergit gelblich; ab 4. Tergit bräunlich-vespoid.

**Typen.** Holotypus: ♂, Litovel, Moravia/ČSFR, 6.58, leg. ? (ZSM).

Ex *Archips* (Tortricidae) (leg. ?).
Tschechien.

## 7. Genus *Mesochorus* Gravenhorst
Abb. 8

*Mesochorus* Gravenhorst, 1829: 960. – Genotypus: *Mesochorus splendidulus* Gravenhorst, des. Curtis, 1833.
*Edrisa* Cameron, 1907: 111 (syn. Dasch 1971, 49). Genotypus: *Edrisa pilicornis* Cameron, des. Townes, 1965.

**Diagnose.** Subocular-Furche zwischen Augen und Mandibel-Basis vorhanden; Scutalsutur breit, grubenförmig; Nervus parallelus über der Mitte der Brachialzelle entspringend; Nervellus nicht gebrochen; Postpetiolus nur mit einfacher Seitenleiste.

Artenreichste Gattung der Unterfamilie (246 europäische Arten = 81 % der Mesochorinae-Arten). Als Primärwirte fungieren, in der Reihenfolge ihrer Häufigkeit: Lepidoptera, Tenthredinoidea, Coleoptera. Als Sekundärwirte: Braconidae, Ichneumonoidea, Tachinidae.

## Bestimmungstabelle der Abteilungen, Sektionen und Gruppen

1(6) Mit einer der Merkmals-Kombinationen der Sektionen 1, 2 oder 3 (Primärwirte: adulte Coleoptera) ........ Abteilung 1. *nigriceps* (S. 35)

2(3) ♀♂ Area petiolaris extrem groß, bis ⅔ der Länge des Metanotums; Abdomen rhomboid (Primärwirte: Chrysomelinae). Nur 1 Art ........ Sektion 1. *phyllodectae* (S. 35)

3(2) Area petiolaris und Abdomen anders

4(5) ♀♂ Radialzelle extrem lang; Radius geschwungen; Flügelstigma verbreitert (Primärwirte: Halticinae) ........ Sektion 2. *curvulus* (S. 35)

5(4) ♀♂ Radialzelle normal; schwarze Gesichtsfarbe zumindest im oberen Gesichtsbereich bis zu den Augen; Wangen ≥ Augenbreite; Mesopleuren stark punktiert; Coxa III schwarz oder stark verdunkelt (Primärwirte: Curculionidae) ........ Sektion 3. *nigripes* (S. 42)

6(1) Ohne Merkmals-Kombinationen der Sektionen 1, 2 oder 3 (Primärwirte: larvale Lepidoptera und Tenthredinoidea) ........ Abteilung 2. *vittator* (S. 45)

7(8) ♀♂ Scutellum mit aufrechter Spitze (Sekundärwirte: Tachinidae) ........ Sektion 4. *politus* (S. 45)

8(7) Scutellum ohne Spitze (Sekundärwirte: Lepidoptera und Tenthredinoidea)

9(10) ♀♂ Nervulus postfurkal, Areola sitzend und Bohrer stabförmig ........ Sektion 5. *dispar* (S. 48)

10(9) Ohne diese Merkmals-Kombination

11(12) ♀♂ Abdomen-Hinterhälfte etwas zusammengedrückt; ♀ Bohrer breit zungenförmig; ♂ Griffel lang, nadelspitz; Mesopleuren rot; Abdomen schwarz, mit schmalem hellem Tergit-1-Endrand ........ Sektion 6. *sylvarum* (S. 59)

12(11) ♀♂ ohne Merkmale von Sektion 6 ........ Sektion 7. *vitticollis* (S. 62)

13(14) ♀♂ Frontalorbiten breit weiß, bis Vertex durchgehend ........ Gruppe 7.1. *orbitalis* (S. 62)

14(13) ♀♂ Frontalorbiten nicht durchgehend breit weiß ........ 5 Gruppen mit verschiedenem Abdomen-Farbmuster:

♀♂ Abd.-Farbmuster H (Hell) Abdomen einfarbig rot ........ Gruppe 7.2. *fulvus* (S. 68)

♀♂ Abd.-Farbmuster D (Dunkel) Abdomen schwarz, evtl. mit schmalen gelbweißen apikalen Tergit-Grenzen ........ Gruppe 7.3. *angustatus* (S. 71)

♀♂ Abd.-Farbmuster HD (Hell/Dunkel) $T_1$ $T_2$ rot/$T_3$ bis $T_8$ schwarz(-braun). Nur 1 Art ........ Gruppe 7.4. *rufopetiolatus* (S. 80)

♀ Abd.-Farbmuster DH (Dunkel/Hell); mindestens $T_1$ und $T_2$ (part.) schwarz(-braun), danach bis Abdomenspitze gelb, rot oder gelb-braun ........ Gruppe 7.5. *declinans* (S. 80)

♀ Abd.-Farbmuster DHD (Dunkel/Hell/Dunkel); Abdomen schwarz oder bräunlich, mit gelber oder roter Mittelbinde; letztes Abd.-Drittel kann auch gebändert (vespoid) sein ........ Gruppe 7.6. *pectoralis* (S. 95)

♂ DH und DHD nicht immer mit ♀ übereinstimmend, daher gemeinsamer ♂ Arten-Schlüssel DH + DHD + D part. (jene ♂♂ der *angustatus*-Gruppe, die in der Abdomen-Mitte ± rot gefärbt sind).

### Abteilung 1. *nigriceps*

**Diagnose.** Mit einer der Merkmals-Kombinationen der Sektionen 1, 2 oder 3.
Sekundär-Parasiten von adulten Coleoptera

### Sektion 1. *phyllodectae*

Sekundär-Parasiten von Chrysomelidae, Chrysomelinae. Nur 1 Art:

### 1. *Mesochorus phyllodectae*, spec. nov.

**Beschreibung.** ♀: 3.0 mm; Schläfe < Augenbreite; Area petiolaris sehr groß, = ⅔-¾ der Metanotum-Länge; Abdomen rhombisch, Tergite 1 + 2 viel breiter als lang; Bohrer = Tarsus III, 1 + 2, zur Spitze verjüngt; Gesicht schwarz, mit weißen Orbiten bis über die Fühleransätze; Thorax schwarz; Coxae und Beine hell, Femora etwas verdunkelt; Abdomen schwarz, mit dunkelroter Tergit-1-Basis und schmalem gelbem Tergit-2-Endrand.

♂: Griffel = Tarsus III, 2; Bau und Färbung wie ♀, aber: Gesichtsmitte nur verdunkelt; Tergit-1-Basis breiter und heller rot.

**Typen.** Holotypus: ♀, Neusatz (Novi Sad)/YU, 1965, leg. Jodal, coll. Schwenke (ZSM). – Paratypen: 1♀, 2♂♂, dto.

Ex *Phyllodecta vitellinae* (Chrysomelidae) an *Populus* (Jod.).
Serbien.

### Sektion 2. *curvulus*

**Diagnose.** 1.8-4 mm; Radialzelle ungewöhnlich lang mit ± geschwungenem Radius; Stigma kurz und breit; Ocellen klein; Bohrer stabförmig (Abb. 1B); Griffel kurz.
Sekundär-Parasiten von Chrysomelidae, Halticinae

### Bestimmungstabelle der Arten (♀♀)

1(2) Tergit 3 braun(-schwarz) mit basaler und apikaler gelber Binde ........................................ 1. *bicinctus*, spec. nov. (S. 37)

2(1) Tergit 3 ohne zwei gelbe Binden

3(12) Bohrer sehr lang: = Tarsus III, 1 + 2 + 3

4(5) Bohrer nach unten gebogen .................... 2. *söderlundi*, spec. nov. (S. 37)

5(4) Bohrer gerade

6(7) Gesicht geschwärzt .................... 3. *minutus* Szepligeti (S. 37)

7(6) Gesicht gelbrot

8(9) Mesopleuren schwarz .................... 4. *palus*, spec. nov. (S. 38)

9(8) Mesopleuren gelbrot

10(11) Stiel-Basis rot .................... 5. *halticae*, spec. nov. (S. 38)

11(10) Stiel-Basis schwarz .................... 6. *religiosus*, spec. nov. (S. 38)

12(3) Bohrer kürzer; max. Tarsus III, 1 + 2

13(14) Gesicht und Abdomen schwarz ..... 7. *subniger*, spec. nov. (S. 38)

14(13) Gesicht und Abdomen (partiell) gelb

15(18) Coxa III geschwärzt oder verdunkelt

16(17) Schläfe = Augenbreite; Basalrand von Tergit 3 schmal gelb ..... 8. *curvulus* Thomson (S. 39)

17(16) Schläfe > Augenbreite; Basalrand von Tergit 3 mit gelber Lasche ..... 9. *turbidus*, spec. nov. (S. 39)

18(15) Coxa III hell

19(22) Schläfe < Augenbreite

20(21) 2 mm; Tergit-2-Ende ⅓ rot ..... 10. *montanus*, spec. nov. (S. 39)

21(20) 3 mm; Tergit-2-Ende ⅛ gelb ..... 11. *bipartitus*, spec. nov. (S. 39)

22(19) Schläfe ≥ Augenbreite

23(24) Metanotum rot; Thorax fast ganz rot ..... 12. *fuscus*, spec. nov. (S. 39)

24(23) Metanotum schwarz; Thorax dunkler

25(32) Länge 2.5-3.8 mm

26(27) Bohrer kaum verjüngt; Tibia-III-Ende ⅛-⅒ verdunkelt ..... 13. *cinctus*, spec. nov. (S. 40)

27(26) Bohrer stark verjüngt; Tibia-III-Ende ¼-⅙ verdunkelt

28(29) Prothorax schwarz; Tibia-III-Ende ¼ verdunkelt ..... 14. *frondosus*, spec. nov. (S. 40)

29(28) Prothorax rot; Tibia III ⅙ verdunkelt

30(31) 2,8 mm; Bohrer sehr schmal, fast spitz ..... 15. *flexus*, spec. nov. (S. 40)

31(30) 3,8 mm; Bohrer breiter; wenig verjüngt ..... 16. *ingentis*, spec. nov. (S. 40)

32(25) Länge 1.8-2.1 mm

33(34) Bohrer fast spitz; Tergit-1-Basis schmal rot ..... 17. *owenae*, spec. nov. (S. 41)

34(33) Bohrer-Ende stumpf; Tergit-1-Basis breit rot ..... 18. *lacassus*, spec. nov. (S. 41)

**Bestimmungstabelle der Arten (♂♂)**

1(2) Tergit 3 braun(-schwarz) mit gelber Basal- und Apikalbinde ..... 1. *bicinctus*, spec. nov. (S. 37)

2(1) Tergit 3 ohne zwei gelbe Binden

3(10) Tergit 3 schwarz(-braun), höchstens mit schmaler gelber Apkal-Binde

4(7) Schläfe > Augenbreite; Coxae III hell

5(6) Mesopleuren schwarz ..... 2. *söderlundi*, spec. nov. (S. 37)

6(5) Mesopleuren rot ..... 19. *vejanus*, spec. nov. (S. 41)

7(4) Schläfe ≤ Augenbreite; Coxae III hell

8(9) Schläfe = Augenbreite; Tibia-III-Ende ⅕ verdunkelt ..... 7. *subniger*, spec. nov. (S. 38)

9(8) Schläfe < Augenbreite; Tibia-III-Ende hell ..... 20. *illustris*, spec. nov. (S. 41)

10(3) Tergit 3 mit ausgedehnter Gelb-Färbung

11(1) Tergit 3 mit breitem gelben Basalband von ⅕-½ der Tergit- Länge

12(13) Mesopleuren schwarz ........ 3. *minutus* Szepligeti (S. 37)

13(12) Mesopleuren rot ........ 4. *palus*, spec. nov. (S. 38)

14(11) Tergit 3 (fast) ganz gelb oder mit gelber Mittellasche

15(18) Tergit 3 (fast) ganz gelb

16(17) Griffel > Tarsus III, 2 ........ 21. *sedis*, spec. nov. (S. 41)

17(16) Griffel = Tarsus III, 2 ........ 22. *parilis*, spec. nov. (S. 42)

18(15) Tergit 3 mit gelber Mittellasche von der Basis zur Tergit-Mitte

19(20) Mesopleuren rot ........ 8. *curvulus* Thomson (S. 39)

20(19) Mesopleuren schwarz

21(22) Tibia-III-Ende ⅕-⅙ geschwärzt ........ 15. *flexus*, spec. nov. (S. 40)

22(21) Tibia-III-Ende ca. ⅒ verdunkelt ........ 14. *frondosus*, spec. nov. (S. 40)

## 1. *Mesochorus bicinctus*, spec. nov.

**Beschreibung.** ♀: 2 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer = Tarsus III, 1 + ¼ 2; Gesicht braun, verdunkelt; Prothorax rot, Meso- und Metathorax schwarz, Mesoscutum mit braunen Wischen; Tergit 1 braun, mit roter Basis; Tergit 2 braun, mit ¼ gelbem Endrand; Tergit 3 braun, mit gelbem Basal- und Apikal-Band; weitere Tergite braun.

♂ wie ♀, aber: Schläfe > Augenbreite; Griffel = Tarsus III, 2, am Ende spatelförmig.

**Typen.** Holotypus: ♀, Niedzwindý BÑw at Miasko/PL, 21.-25.7.77, Ekipa, IOLID AR (Warschau). – Paratypen: 1♂, Hamernia at Warszawa/PL, Ekipa, IZ PAN (Warschau); 1♀, Pfullingen, Württ./D, 720 m, E. Haeselbarth (ZSM).

Polen, Deutschland.

## 2. *Mesochorus söderlundi*, spec. nov.

**Beschreibung.** ♀: 2.4 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer = Tarsus III, 1 + 2 + 3, im letzten Drittel nach unten gebogen; Thorax schwarz, Mesoscutum mit rötlicher Makel; Tergit 1 schwarz; Tergit 2 braun-schwarz, mit schmalem gelbem Endrand; Tergit 3 braun, mit ⅕ gelb-braunem Basalband; weitere Tergite braun, mit schmalen hellen Endrändern.

♂: 3 mm, wie ♀, aber: Schläfe > Augenbreite; Griffel = Tarsus III, 2, etwas spatelförmig; Prothorax überwiegend rot; gelber Tergit-2-Basalstreifen mit Lasche zur Tergit-Mitte.

**Typen.** Holotypus: ♀, Göteborg Angered/S, Vg., Laubgehölz, 9.9.79, M. Söderlund (Söderlund). – Paratypus: 1♂, Göteborg, Sanna Sjöbergen/S, Vg., Laubgehölz v. a. Birke, M. Söderlund (Söderlund).

Schweden.

## 3. *Mesochorus minutus* Szepligeti

*Mesochorus minutus* Szepligeti, 1914: 432, ♀.
*Mesochorus minutus*, Aubert 1968: 17♂.
*Mesochorus phyllotretae* Jourdheuil, 1957: 41-45, ♀♂ (syn. Aubert 1968).

**Diagnose.** ♀: 1.8-2.5 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Bohrer = Tarsus III, 1 + 2 + 3; Gesicht geschwärzt;Thorax schwarz; Coxae III verdunkelt; Tibia-III-Ende ca. ⅙ geschwärzt; Abdomen schwarzbraun; Tergit 1 mit roter Basis; Tergit 2 mit gelbem Apikalband; Tergit 3 mit gelbem Basalband; folgende Tergite mit gelben Apikalrändern.

♂: Schläfe = Augenbreite; Griffel = Tarsus III, 2; Größe und Färbung wie ♀, aber: Gesicht und Coxa III weniger verdunkelt (selten unverdunkelt).

**Typen.** Holotypus: ♀, Hym. Typ Nr. 108 (Budapest).

Ex *Phyllotreta* 6 spp. (Jourd., Lo.) und 1 *Aphthona* sp. (Jourd.) via *Microctonus* spp. (Braconidae) (Sommer 1981).
Fundorte in Deutschland, Frankreich, N-Italien, Österreich, Ungarn.
M-, W- und SE-Europa.

### 4. *Mesochorus palus*, spec. nov.

**Beschreibung.** ♀: 2.8 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Bohrer = Tarsus III, 1 + 2 + 3. Prothorax und Mesopleuren rot; Mesoscutum schwarz, mit roten Längsstreifen; Stigma hyalin; Tibia-III-Ende hell; Abdomen schwarz; Tergit 1 mit breiter hellroter Basis; Tergit 2 mit gelbem bogenförmigem Endband bis zur Mitte; Tergit 3 mit gelbem Basalband bis Mitte; folgende Tergite mit schmalen hellen Endstreifen.

♂ wie ♀, aber: Thorax außer braunen Mesonotum-Wischen gelbrot; Griffel = Tarsus III, 2, etwas spatelförmig.

**Typen.** Holotypus: ♀, Srbija Ráska, Bukovice/YU, M. Glavendekic (Glavendekic). – Paratypen: 2♂♂, dto.

Jugoslawien.

### 5. *Mesochorus halticae*, spec. nov.

**Beschreibung.** ♀: 2.6 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Thorax rot, mit braunen Wischen auf Mesoscutum und Metanotum; Stigma hyalin, weiß schillernd; Tergite 1 und 2 schwarzbraun; Tergit 1 mit breiter roter Basis; Tergit 2 mit bogenförmiger gelber Hinter-Hälfte; ab Tergit 3 braun-rot, mit schmalen gelben Endrändern. Bohrer wie *M. palus*.

**Typen.** Holotypus: ♀, Sion, Wallis/CH, 20.9./3.11.77, leg. ? (ZSM). – Paratypus: 1♂, dto.

Ex *Haltica carduorum*.
Schweiz.

### 6. *Mesochorus religiosus*, spec. nov.

**Beschreibung.** ♀: 2.3 mm; s. Genus-Merkmale; Schläfe < Augenbreite; Bohrer = Tarsus III, 1 + 2 + 3, gerade, stabförmig; Thorax schwarz; Prothorax, Mesoscutum-Makel, Scutellum z.T. rot; Stigma schmutzig-hyalin; Tergit 1 schwarz; Tergit 2 basale Hälfte schwarz, apikale Hälfte rötlich; Tergit 3 rot; Tergit 4 und folgende Tergite braun.

**Typen.** Holotypus: ♀, Kapernaum/Israel, Wiese am Seeufer Genezareth, 13.2.80, M. Söderlund (Söderlund).

Israel.

### 7. *Mesochorus subniger*, spec. nov.

**Beschreibung.** ♀: 3.8 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Bohrer = Tarsus III, 1, zum Ende dünner und etwas aufgebogen; Gesicht schwarz, schmale Orbiten rot; Thorax schwarz; Stigma hyalin; Coxa III verdunkelt; Tibia-III-Ende ⅕ verdunkelt; Abdomen schwarz, mit schmalen hellen Tergit-Endrändern.

♂: 3.4 mm; Schläfe = Augenbreite; Griffel > Tarsus III, 2; sonst wie ♀, aber: Gesicht gelb.

**Typen.** Holotypus: ♀, Feldthurns, Bozen/I, 1.200 m, 11.9.78, E. Haeselbarth (ZSM). – Paratypus; 1♂, Mühlbach, Pustertal/I, 800 m, E. Haeselbarth (ZSM).

N-Italien.

### 8. *Mesochorus curvulus* Thomson

*Mesochorus curvulus* Thomson, 1885: 343, ♀ ♂.

**Diagnose.** ♀: 2.3-3.5 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer > Tarsus III, 1 (Abb. 1B); Gesicht gelbrot, manchmal etwas verdunkelt; Thorax schwarz; Tibia-III-Ende ⅙ geschwärzt; Coxa III geschwärzt; Abdomen schwarz; Tergit-2-Endrand und Tergit-3-Basalrand schmal gelb.

♂: Griffel = Tarsus III, 2, kurz und dick; Größe und Färbung wie ♀, aber: Prothorax und Mesopleuren rot; Coxa III weniger verdunkelt bis hell.

**Typen.** Lectotypus: ♂, Schwenke 1968, Örtofta/S (UZI Lund).

Fundorte in Schweden, Deutschland, Österreich, Schweiz, ital. Alpen, französ. Alpen.
N- und M-Europa einschließlich Alpen.

### 9. *Mesochorus turbidus*, spec. nov.

**Beschreibung.** ♀: 2.7 mm; s. Sektions-Merkmale; Schläfe > Augenbreite; Bohrer = Tarsus III, 1, schmal, am Ende aufgebogen; Gesicht geschwärzt; Thorax schwarz; Stigma hyalin; Coxa III verdunkelt; Tibia-III-Ende ⅙ geschwärzt; Abdomen schwarz; Tergit 2 apikal breit gelb-weiß; Tergit 3 mit roter Lasche von Basis zur Mitte.

**Typen.** Holotypus: ♀, Villanders, Bozen/I, 21.9.78, E. Haeselbarth (ZSM).

Ital. Alpen.

### 10. *Mesochorus montanus*, spec. nov.

**Beschreibung.** ♀: 2.0 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Bohrer = Tarsus III, 1, am Ende etwas aufgebogen; Gesicht rot; Thorax oberseits schwarz, seitlich rot; Coxa III rot; Abdomen schwarz(-braun); Tergit 1 basal breit gelbrot; Tergit 2 apikal ⅓ rot.

**Typen.** Holotypus: ♀, Gampenjoch, Südtirol/I, 1.350 m, 23.7.66, E. Haeselbarth (ZSM).

N-Ialien.

### 11. *Mesochorus bipartitus*, spec. nov.

**Beschreibung.** ♀: 3.0 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Bohrer etwas > Tarsus III, 1; Gesicht verdunkelt; Thorax schwarz; Stigma obere Hälfte hyalin, untere Hälfte braun; Abdomen schwarz; Tergit-2-Endrand schmal weiß; Tergit-3-Basis breit rötlich.

**Typen.** Holotypus: ♀, Bramwald, Niedersachsen/D, 30.7.67, E. Haeselbarth (ZSM).

N-Deutschland.

### 12. *Mesochorus fuscus*, spec. nov.

**Beschreibung.** ♀: 2.5 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer = Tarsus III, 1 + ⅓ 2; Gesicht gelb, etwas dunkel gefleckt; Thorax rot, mit braunen Wischen auf Mesoscutum und Mesopleuren; Abdomen schwarz; Tergit-1-Basis rot; Tergit-2-Ende schmal gelb; Tergit-3-Ende breiter gelb.

**Typen.** Holotypus: ♀, Leicester/UK, 7.73, Jennifer Owen (AEI).

England.

### 13. *Mesochorus cinctus*, spec. nov.

**Beschreibung.** ♀: 3.1 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer > Tarsus III, 1; Gesicht gelbrot; Thorax schwarz; Prothorax rötlich; Stigma hellbraun; Coxa III hell; Tibia-III-Ende schmal undeutlich verdunkelt; Abdomen schwarz; Tergit 2 apikal und Tergit 3 basal schmal gelb.

**Typen.** Holotypus: ♀, St. Peter, Ahrntal, Südtirol/I, 1.300 m, 31.7.66, E. Haeselbarth (ZSM).

Italienische Alpen.

### 14. *Mesochorus frondosus*, spec. nov.

**Beschreibung.** ♀: 2.5 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer = Tarsus III, 1, am Ende schmaler; Gesicht stark verdunkelt; Thorax schwarz; Stigma bräunlich-hyalin; Tibia-III-Ende $^1/_{10}$ verdunkelt; Abdomen schwarz, mit breiter roter Tergit-1-Basis, mit ⅕ gelbem Tergit-2-Endband und mit gelber Lasche von Tergit-3-Basis zur Mitte.

♂: 2.5 mm; Griffel = Tarsus III, 2; Färbung wie ♀.

**Typen.** Holotypus: ♀, Dessau/D, 7.5 km Süd, 5.7.88, Nr. 154/88, Waldweg, H. Zoerner (DEI). – Paratypen: 1♀, Coswig, Fläming/D, 1988, Laubwald; 1♂, Roßlau, Fläming/D, 1988, Waldweg, H. Zoerner (DEI).

M-Deutschland.

### 15. *Mesochorus flexus*, spec. nov.

**Beschreibung.** ♀, ♂: 2.8-3.5 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer > Tarsus III, 1, am Ende etwas aufgebogen, sehr schmal, fast spitz; Gesicht gelbrot bis leicht verdunkelt; Färbung wie *M. cinctus*, aber: Stigma hyalin, mit braunem Grundwinkel und Tibia-III-Ende ⅕-⅙ geschwärzt.

♂: Griffel = Tarsus III, 2, mit sehr großen Basalkörpern; Färbung wie ♀, aber: Tergit 3 basal breiter gelb, mit gelber Lasche zur Tergit-Mitte.

**Typen.** Holotypus: ♀, Dessau/D, 4,5 km NW, 21.6.88, H. Zoerner (DEI). – Paratypen: 6♀♀, Polen (Mus. Warsz.); 3♀♀, 6♂♂, Dessau/D, H. Zoerner (DEI).

Polen, Deutschland.

### 16. *Mesochorus ingentis*, spec. nov.

**Beschreibung.** ♀: 3.8 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer = Tasus III, 1, erheblich breiter als bei *flexus*, kaum verjüngt; Prothorax rot, übriger Thorax schwarz; Stigma bräunlich-haylin; Abdomen schwarz; Tergit-2-Endrand schmal gelb; Tergit 3 mit verwaschenem roten Mittellängsband.

**Typen.** Holotypus: ♀, Polen, Nr. 220 (Warschau).

Polen.

### 17. *Mesochorus owenae*, spec. nov.

**Beschreibung.** ♀: 2.1 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer > Tarsus III, 1, dünn, fast spitz; Abdomen schwarz; Tergit-1-Basis schmal rot; Tergit-2-Endrand und Tergit-3-Basalrand schmal gelb.

**Typen.** Holotypus: ♀, Leicester/UK, 23.7.72, Jennifer Owen (AEI).

England.

### 18. *Mesochorus lacassus*, spec. nov.

**Beschreibung.** ♀: 1.8 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer > Tarsus III, 1, stumpf; Prothorax rot, Mesonotum und Mesopleuren schwarz, mit roten Wischen; Metathorax schwarz; Abdomen wie bei *M. owenae*, aber: Tergit-1-Basis breit rot.

**Typen.** Holotypus: ♀, Piemonte/I, La Cassa, To., 8.82, A. Scaramozzino (Scaramozzino).

N-Italien.

Von den folgenden Arten sind nur die ♂♂ bekannt.

### 19. *Mesochorus vejanus*, spec. nov.

**Beschreibung.** ♂: 3.0 mm; s. Sektions-Merkmale; Schläfe > Augenbreite; Griffel dick = Tarsus III, 2; Prothorax und Mesopleuren rot; Mesonotum braun; Metathorax braun-schwarz; Stigma hyalin; Tibia-III-Ende schmal gebräunt; Abdomen schwarz; Tergit-2-Endrand und Tergit-3-Basalrand schmal gelb.

**Typen.** Holotypus: ♂, La Veja, Sierra Morena/E, 28.4.26, Seyrig (Paris).

Spanien.

### 20. *Mesochorus illustris*, spec. nov.

**Beschreibung.** ♂: 3.2 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Radialzelle und Stigma s. Genus; Griffel = Tarsus III, 2; Prothorax und Mesopleuren rot; übriger Thorax schwarz; Mesonotum mit braunen Wischen; Stigma hyalin; Coxa III leicht verdunkelt; Tibia-III-Ende hell; Abdomen schwarz, nur Tergit 2 mit schmalem gelbem Endband,

**Typen.** Holotypus: ♂, Stiege, Harz/D, 1,5 km SE, Nr. 37/88, H. Zoerner (DEI).

Deutschland.

### 21. *Mesochorus sedis*, spec. nov.

**Beschreibung.** ♂: 3.0 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Griffel > Tarsus III, 2; Prothorax, Meso- und Metapleuren rot-gelb; Mesoscutum rot, mit braunen Wischen; Metanotum basal braun, apikal rot; Tibia-III-Ende hell; Tergit 1 gelbrot-braun-gelbrot; Tergit 2 braun, mit ⅙ gelbem Endrand; Tergit 3 fast ganz gelbrot; folgende Tergite schwarz.

**Typen.** Holotypus: ♂, Roßlau/D, 4,5 km NE, Fläming, Waldweg, Nr. 144/92, H. Zoerner (DEI).

Deutschland.

### 22. *Mesochorus parilis*, spec. nov.

**Beschreibung.** ♂: 2.5 mm; s. Sektions-Merkmale; Schläfe $<$ Augenbreite; Griffel dünn = Tarsus III, 2; Prothorax und Mesopleuren rot, übriger Thorax braun(-schwarz); Stigma hellbraun; Coxa III hell; Tibia-III-Ende ⅙ geschwärzt; Tergit-1-Basis hellrot; Tergit 2 apikal fast ½ gelb; Tergit 3 fast ganz gelb.

**Typen.** Holotypus: ♂, Erlangen, Mfr./D, 15.8.79, W. Schwenke (ZSM).

Ex *Altica cypareraceorum* (Schw.).
Deutschland.

## Sektion 3. *nigripes*

**Diagnose.** Merkmals-Kombination: Coxa III, meist auch Coxa II, verdunkelt oder geschwärzt; Schläfe breit ($\geq$ Augenbreite); Ocellen sehr klein; Gesicht schwarz, beim ♀ bis Augenrand; Mesopleuren vor allem beim ♀ stark punktiert.

Primärwirte: adulte Curculionidae.

### Bestimmungstabelle der Arten (♀♀)

1(4) Coxa II unverdunkelt

2(3) Schläfe $>$ Augenbreite; Bohrer $<$ Tarsus III, 1, zum Ende aufgebogen ............ 1. *haeselbarthi*, spec. nov. (S. 43)

3(2) Schläfe = Augenbreite; Bohrer = Tarsus III, 2, gerade ............ 2. *amplitudinis*, spec. nov. (S. 43)

4(1) Coxa II geschwärzt oder verdunkelt

5(6) Femur III schwarz ............ 3. *nigripes* Ratzeburg (S. 43)

6(5) Femur III höchstens gebräunt

7(10) Stigma rein hyalin

8(9) Länge 2.8-3.0 mm; Bohrer fast spitz ............ 4. *rivanus*, spec. nov. (S. 44)

9(8) Länge 4.4-4.8 mm; Bohrer nur wenig verjüngt ............ 5. *frigidus*, spec. nov. (S. 44)

10(7) Stigma gelblich oder bräunlich

11(12) Länge 3.3 mm; Pro- und Mesothorax, seitlich betrachtet, quadratisch ............ 6. *compactus*, spec. nov. (S. 44)

12(11) Länge 4.8-6.3 mm; Pro- und Mesothorax, seitlich betrachtet, rechteckig ............ 7. *nigriceps* Thomson (S. 44)

### Bestimmungstabelle der Arten (♂♂)

1(2) Femur III schwarz ............ 3. *nigripes* Ratzeburg (S. 43)

2(1) Femur III höchstens gebräunt

3(4) Coxa II unverdunkelt ............ 2. *amplitudinis*, spec. nov. (S. 43)

4(3) Coxa II geschwärzt oder stark verdunkelt

5(6) Abdomen-Hinterhälfte vespoid ............ 8. *montis*, spec. nov. (S. 45)

6(5) Abdomen-Hinterhälfte schwarz(-braun)

7(10) Facialorbiten in ganzer Länge rot

8(9) Tergit 3 schwarz ........ 9. *spessartaeus*, spec. nov. (S. 45)

9(8) Tergit 3 rot ........ 10. *mellumiensis*, spec. nov. (S. 45)

10(7) Facialorbiten bis Gesichtsmitte rot

11(12) Länge 3 mm; Femur III gebräunt ........ 6. *compactus*, spec. nov. (S. 44)

12(11) Länge 4.2-6.7 mm; Femur III gelbrot ........ 7. *nigriceps* Thomson (S. 44)

### 1. *Mesochorus haeselbarthi*, spec. nov.

**Beschreibung.** ♀, ♂: 5.4-5.5 mm; Schläfe > Augenbreite; Mesopleuren stark punktiert; Nervulus praefurkal; Bohrer viel < Tarsus III, 1, zum Ende aufgebogen; Griffel extrem kurz (< ½ Tarsus III, 2), mit sehr großen Basalkörpern; Kopf schwarz; Mandibeln gelbweiß; die basal verbreiterten bis zur Augenmitte reichenden, spitz auslaufenden roten Orbiten ergeben mit dem roten Clypeus eine W-Form des schwarzen unteren Gesichts; Schläfenfleck rot; Thorax schwarz; Stigma schmutzig-hyalin; Coxa II ♀ hell, ♂ verdunkelt; Coxa III geschwärzt; Abdomen schwarz, ab 2. Tergit mit breiten, gelbweißen, apikalen Bändern (vespoid).

**Typen.** Holotypus: ♀, Lechtaler Alpen, Tirol/A, Bleispitze 2.200 m, 14.8. 74, E. Haeselbarth (ZSM). – Paratypen: 1♂, Berwang, Tirol/A; 1♀, Ditztal, Riffelsee 2.350 m, E. Haeselbarth (ZSM); 1♀, Klausenpaß, N-Italien, R. Hinz (ZSM).

M-Alpen.

### 2. *Mesochorus amplitudinis*, spec. nov.

**Beschreibung.** ♀, ♂: 3.9-4.6 mm; Schläfe = Augenbreite; Mesopleuren stark punktiert; Bohrer = Tarsus III, 1, zum Ende verjüngt; Griffel = Tarsus III, 2, stabförmig; Gesicht schwarz; Thorax schwarz; Stigma hellbraun; Coxa II rot, Coxa III verdunkelt; Tibia-III-Ende unscharf, schmal, verdunkelt; Abdomen schwarz; Tergit 2 mit ⅕-1/7 rotem Endsaum; Tergit 3 rot, im apikalen Drittel gebräunt; die folgenden Tergite braun-schwarz.

**Typen.** Holotypus: ♀, Feldthurns, Südtirol/I, 1.200 m, 11.7.78, E. Haeselbarth (ZSM). – Paratypen: 8♀♀, 11♂♂, Polen, Deutschland, Österreich, Schweiz, Frankreich, N-Italien, (Krefeld, ZSM, Warschau, (DEI).

Europa, außer S und E.

### 3. *Mesochorus nigripes* Ratzeburg

*Mesochorus nigripes* Ratzeburg, 1852: 119, ♀.
*Mesochorus melas* Boyer de Fonscolombe, 1852: 440, ♀ ♂; **syn. nov.** nach Lectotypus.
*Mesochorus gibbulus* Holmgren, 1858: 124, ♀ ♂; syn. Schmiedeknecht 1910: 1970.
*Mesochorus alpigenus* Strobl, 1902: 104; **syn. nov.** nach Lectotypus.

**Diagnose.** ♀, ♂: 3.5-4.2 mm; Schläfe > Augenbreite; Bohrer > Tarsus III, 1, am Ende aufgebogen; Griffel > Tarsus III, 2, am Ende etwas verbreitert; Kopf, Thorax und Abdomen schwarz; alle Coxae schwarz; Femur III schwarz; Tergit 2 mit schmalem gelbem Endrand, beim ♂ etwas breiter.

**Typen.** Verschollen. – *Mesochorus melas* Fonscolombe: Lectotypus: ♀, Horstmann 1980, coll. Sichel (Paris). – *Mesochorus alpigenus* Strobl: Lectotypus: ♀, Schwenke 1969 (Admont).

Ex *Phytonomus posticus* (Alfalfa Weevil) (Curculionidae) via *Bathyplectus* (Ichneumonidae) (Cham. 1824); ex *Phytonomus* sp. (Curculionidae) (Ratzeburg 1852).

Fundorte in Schweden, Deutschland, Frankreich, Schweiz, Österreich, N-Italien.
N- und M-Europa, nördl. S-Europa.

### 4. *Mesochorus rivanus*, spec. nov.

**Beschreibung.** ♀: 2.8-3.0 mm; Schläfe = Augenbreite; Bohrer schmal, zum Ende unterseits stark verjüngt, fast spitz, = Tarsus III, 1; Gesicht schwarz; untere Hälfte des Clypeus und untere Orbiten rot; Stigma hyalin; Körper schwarz; alle Coxae verdunkelt; apikale Segment-Grenzen ab Tergit 2 schmal gelb(-rot).

**Typen.** Holotypus: ♀, Campi Riva s. Gardi, E-Italien, 7.9.67, 1.500 m, E. Haeselbarth (ZSM). – Paratypus: 1♀, Giagleone, TO/I, R. Bassi (Scaramozzino).

N-Italien.

### 5. *Mesochorus frigidus*, spec. nov.

**Beschreibung.** ♀: 4.4-4.8 mm; Schläfe = Augenbreite; Stigma schmal; Bohrer = Tarsus III, 1, am Ende wenig verjüngt; Kopf schwarz, Clypeus gelbrot, breite Facial- und schmale Frontal-Orbiten rot; je ein Vertex-Fleck rot; Thorax und Abdomen schwarz; Stigma hyalin; alle Coxae geschwärzt; apikale Segment-Grenzen ab Tergit 2 sehr schmal gelblich.

**Typen.** Holotypus: ♀, Kiruna/S, 22.7.64, R. Hinz (ZSM). – Paratypus: 1♀, dto, 19.7.69, R. Hinz (ZSM).

N-Schweden.

### 6. *Mesochorus compactus*, spec. nov.

**Beschreibung.** ♀, ♂: 3 mm; Schläfe > Augenbreite; Pro- und Mesothorax, seitlich betrachtet, quadratisch; Bohrer stabförmig, > Tarsus III, 1, am Ende etwas aufgebogen; Griffel = Tarsus III, 2; Kopf schwarz, Mandibeln gelblich; Clypeus-Vorderrand rot; Gesicht schwarz bis zu den Augen; Stigma hellbraun; Thorax und Abdomen schwarz; alle Coxae verdunkelt oder schwarz; Femur III gebräunt; Tergit-2-Endrand schmal rot; Tergit-3-Basalrand und Mitte (undeutlich) rot (♀) oder ganz rot, mit Verdunkelungen (♂).

**Typen.** Holotypus: ♀, Bichlbach, Tirol/A, 1.600 m, 9.7.76, E. Haeselbarth (ZSM). – Paratypen: 1♂, Kochel, Bay./D, 1.000 m; 2♀♀, 2♂♂, Tirol, Bayer. Alpen, E. Haeselbarth (ZSM).

Mittlere Alpen.

### 7. *Mesochorus nigriceps* Thomson

*Mesochorus nigriceps* Thomson, 1885: 334, ♀♂.
*Mesochorus punctipleuris* Thomson, 1885 334, ♀♂; **syn. nov.** nach Lectotypus.
*Mesochorus thomsoni* Dalla Torre, 1901: 59, ♀♂; syn. Szepligeti 1911.

**Diagnose.** ♀, ♂: 4.2-6.8 mm; Schläfe < Augenbreite; Bohrer > Tarsus III, 1, schmal, am Ende etwas verjüngt; Griffel > Tarsus III, 2; Kopf schwarz, Mandibeln und zuweilen Clypeus-Vorderrand (gelb-)rot; Scheitelflecken rot; Thorax und Abdomen schwarz; Stigma bräunlich-hyalin; Coxae I und II partiell geschwärzt, Coxa III ganz schwarz; Tergit-2-Endrand schmal rot; Tergit-3-Mitte rot (♀) oder fast ganz rot (♂).

Häufigste Art der Sektion. Gleichwohl fehlen gesicherte Primärwirt-Angaben. Dasch (1971) nennt unter den Primärwirten neben dem Curculioniden *Hypera postica* Gyll., Idaho/USA, auch Lepidopteren, was unglaubhaft erscheint.

**Typen.** *Mes. punctipleuris* Thomson: Lectotypus: ♀, Aubert 1966 (UZI Lund).

C. E. Dasch, 1971, 199, stellt *M. nigriceps* Thomson, 1885 synonym zu *M. agilis* Cresson, 1865. Jedoch differiert laut Beschreibung sein nordamerikanisches Material von meinem europäischen in zahlreichen Merkmalen. *M. agilis* Cresson ist daher nicht identisch mit *M. nigriceps* Thomson.
Fundorte in Schweden, Polen, Deutschland, Frankreich, Schweiz, Österreich, Italien.
N-, M- und nördl. S-Europa.

### 8. *Mesochorus montis*, spec. nov.

**Beschreibung.** ♂: 6 mm; Schläfe = Augenbreite; Mesopleuren stark punktiert; Stigma verkleinert; Griffel abgebrochen; Gesicht schwarz; Thorax schwarz; Stigma schmutzig hyalin; Coxa II braun, verdunkelt; Coxa III geschwärzt; Tibia-III-Ende undeutlich schmal verdunkelt; Abdomen schwarz; Tergit 1 mit sehr schmalem hellem Endrand; Tergit 2 schwarz, mit ¹⁄₁₀ weißem Endsaum; folgende Tergite braun (dominierend) / gelb-gebändert, mit sehr schmalen weißen Endrändern.

**Typen.** Holotypus: ♂, Berang, Tirol/A, Bichlbächler Joch, 1.900 m, 21.7.72, E. Haeselbarth (ZSM).

Österr. Alpen.

### 9. *Mesochorus spessartaeus*, spec. nov.

**Beschreibung.** ♂: 3.8 mm; Schläfe = Augenbreite; Mesopleuren fast glatt; Griffel kurz, = Tarsus III, 2, kompakt; Gesicht schwarz, mit schmalen roten Orbiten; Thorax schwarz; Stigma schmutzig hyalin; Coxae II + III geschwärzt; Tibia-III-Ende unscharf schmal verdunkelt; Abdomen schwarz, mit je einer schmalen roten Tergit-2-Endbinde und ebensolcher Tergit-3-Basalbinde.

**Typen.** Holotypus: ♂, Wiesen, Spessart/D, 1.6.60, E. Haeselbarth (ZSM).

Deutschland.

### 10. *Mesochorus mellumiensis*, spec. nov.

**Beschreibung.** ♂: 2.4 mm; Schläfe = Augenbreite; Mesopleuren stark punktiert; Griffel > Tarsus III, 2, stabförmig; Gesicht untere Hälfte rot, obere Hälfte braunschwarz, mit mittelbreiten roten Orbiten; Thorax schwarz; Stigma schmutzig hyalin; Coxa II braun-schwarz; Coxa III schwarz verdunkelt; Tibia-III-Ende undeutlich schmal verdunkelt; Abdomen schwarz; Tergit 2 mit schmalem rotem Endsaum; ab Tergit 3 rot/braun gebändert.

**Typen.** Holotypus: ♂, Insel Mellum/D, FS 15/W, Nr. 746, 17.-24.5.86, H. Horstmann (Horstmann).

N-Deutschland.

## Abteilung 2. *vittator*

Sekundär-Parasiten von larvalen Lepidoptera und Thenthredinoidea

### Sektion 4. *politus*

**Diagnose.** Scutellum mit aufrechter Spitze; Sekundärwirte: Tachinidae.
Auffällige Entsprechung zwischen *Astiphromma dorsale*-Gruppe (s. dort) und *Mesochorus politus*-Gruppe: beide mit Höcker auf dem Scutellum bei gleicher Lebensweise als Sekundär-Parasiten von Tachinidae. Erklärung: Dorn dient dem Aufbrechen des Tachinen-Tönnchens.

### Bestimmungstabelle der Arten (♀♀)

1(6) Mesopleuren dicht und tief punktiert

2(3) Bohrer > Tarsus III, 1, fast stabförmig ........ 1. *zoerneri*, spec. nov. (S. 46)

3(2) Bohrer < Tarsus III, 1, breiter

4(5) Stigma breit, schwarzbraun; Tergit-Endbänder sehr schmal gelblich ........ 2. *politus* Gravenhorst (S. 47)

5(4) Stigma schmaler, hell-bräunlich; Tergit-Endränder breit rot ........ 3. *scandinavicus*, spec. nov. (S. 47)

6(1) Mesopleuren schütter und relativ fein punktiert

7(8) Klauenglieder etwas aufgebläht ........ 4. *hinzi*, spec. nov. (S. 47)

8(7) Klauenglieder normal ........ 5. *tuberculiger* Thomson (S. 47)

### Bestimmungstabelle der Arten (♂♂)

1(2) Griffel gamshornförmig nach oben gebogen, am Ende verbreitert ........ 3. *scandinavicus*, spec. nov. (S. 47)

2(1) Griffel gerade

3(4) Griffel dick und klobig ........ 4. *hinzi*, spec. nov. (S. 47)

4(3) Griffel schlank

5(6) Griffel-Ende verbreitert ........ 1. *zoerneri*, spec. nov. (S. 46)

6(5) Griffel-Ende nicht verbreitert

7(8) Ocellen > Vertexbrücke ........ 2. *politus* Gravenhorst (S. 47)

8(7) Ocellen < Vertexbrücke

9(10) Länge > 4 mm; Schläfe = Augenbreite ........ 5.*tuberculiger* Thomson (S. 47)

10(9) < 4 mm; Schlälfe < Augenbreite

11(12) Griffel > Tarsus III, 2; Gesicht dunkel ........ 6. *sincerus*, spec. nov. (S. 48)

12(11) Griffel = Tarsus III, 2; Gesicht hell ........ 7. *contractus*, spec. nov. (S. 48)

### 1. *Mesochorus zoerneri*, spec. nov.

**Beschreibung.** ♀: 4.3-5.2 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren dicht und tief punktiert; Scutellum mit aufrechter Spitze; Stigma verbreitert; Bohrer schmal, stabförmig = Tarsus III, 1 + 2; Gesicht schwarz oder stark gebräunt, mit roten Orbiten; Thorax und Abdomen schwarz, nur Tergit-2-Endrand schmal rötlich.
♂ wie ♀, aber: Gesichts-Verdunklung schwächer; Mesopleuren schwächer punktiert; Griffel lang und dünn, > Tarsus III, 2.

**Typen.** Holotypus: ♀, Dessau/D, 6,6 km SSW, 13.8.85, Nr. 178/85, frischer Waldweg, H. Zoerner (DEI). – Paratypen: 5♀♀, 6♂♂, Dessau/D; 1♀, Siptenfeld, H. Zoerner (DEI).

M-Deutschland.

## 2. *Mesochorus politus* Gravenhorst

*Mesochorus politus* Gravenhorst, 1829: 974, ♀♂.
*Mesochorus errabundus* Hartig, 1838: 262♀♂; syn. K. Horstmann 1988, 20.

**Diagnose.** ♀: 5.5-8.0 mm; Schläfe sehr schmal, < ½ Augenbreite; Ocellus > Vertexbrücke; Scutellum mit aufrechter Spitze; Stigma verbreitert; Bohrer < Tarsus III, 1; Gesicht schwarz, Clypeus rot, Facialorbiten breit weiß; Prothorax schwarz und rot, übriger Thorax schwarz; Abdomen schwarz, mit roter Stielbasis und ca. ⅛ schmalem rotgelbem Tergit-2-Endrand; folgende Tergit-Endränder sehr schmal hell.
♂ wie ♀, aber: Gesicht hell oder gebräunt; Abdomen ab Tergit 3 verwaschen-vespoid; Griffel > Tarsus III, 2, schlank, von Basis zur Spitze gleichmäßig dünner.

**Typen.** Verschollen.

Ex *Bupalus, Ematurga* (Geometridae) via *Blondelia* (Tachinidae) (Schw.); ex *Deilinia* (Geometridae) via *Privaldskia* (Tachinidae) (Hz.).
Fundorte in Schweden, Polen, Deutschland, Tschechien, N-Frankreich.
N- und M-Europa.

## 3. *Mesochorus scandinavicus*, spec. nov.

**Beschreibung.** ♀, ♂: 5.5-6.3 mm; wie *M. politus*, aber i. M. kleiner und graziler; Mesopleuren flacher punktiert, mit Rotschimmer; Stigma viel schmaler, heller braun; Tergite 3 und folgende mit breitem rötlichen Endrand; Griffel gamshornartig nach oben gebogen, am Ende verbreitert.

**Typen.** Holotypus: ♀, Skåne/S, 7. u. 8.69, in Fallen, Bo Svenssen (AEI). – Paratypen: 4♀♀, 3♂♂, dto.

Schweden.

## 4. *Mesochorus hinzi*, spec. nov.

**Beschreibung.** ♀: 4.0-4.7 mm; Schläfe > Augenbreite; Ocellen < Vertexbrücke; Mesopleuren fein punktiert; Scutellum mit aufrechter Spitze; Stigma verbreitert; Klauenglieder etwas aufgebläht; Postpetiolus sehr breit, längsgerieft; Tergite 2 + 3 in der Mitte mit flacher Delle; Bohrer relativ breit, am Ende verschmälert, > Tarsus III, 1; Gesicht schwarz, mit gelbem Clypeus und breiten, roten Facialorbiten; Thorax und Abdomen schwarz; Tergite 2 und folgende mit feinen gelben Endrändern.
♂ wie ♀, aber mit normalen Klauengliedern; Tergit 1 mit breitem rotem Endrand; Tergite 2 + 3 mit breitem gelbem Endrand; Tergit 3 auch in der Mitte gelb; Griffel kurz und klobig, = Tarsus III, 2.

**Typen.** Holotypus: ♀, Kiruna/S, 22.7.64, R. Hinz (ZSM). – Paratypen: 7♀♀, 9♂♂, Kiruna/S, R. Hinz (ZSM).

N-Schweden.

## 5. *Mesochorus tuberculiger* Thomson

*Mesochorus tuberculiger* Thomson, 1885: 333, ♀♂.

**Diagnose.** ♀, ♂: 5-7 mm; *M. politus* sehr ähnlich, aber i. M. kleiner und graziler; Schläfe breiter (> Augenbreite); Mesopleuren fast glatt; Bohrer am Ende etwas nach oben gebogen.

**Typen.** Lectotypus; ♀ Townes, Momoi & Townes, 1965 (UZI Lund).

Ex *Hibernia* (Geometridae) via Tachinen-Tönnchen, Spessart (Haes.); ex *Hibernia,* via Tachinidae, Hannover (Hz.).
Es scheint, daß *M. politus* Nadelholz-Geometridae und *M. tuberculiger* Laubholz-Geometridae als Primärwirte haben.
Fundorte in Schweden, Deutschland, N-Frankreich, Österreich, N-Italien.
N- und M-Europa.

### 6. *Mesochorus sincerus*, spec. nov.

**Beschreibung.** ♂: 3.5 mm; Schläfe < Augenbreite; Mesopleuren obere Hälfte stark punktiert; Griffel dünn, > Tarsus III, 2; Gesicht in Mitte gebräunt; Thorax schwarz; Prothorax rot und schwarz; Mesopleuren mit Rotschimmer; Mesonotum mit schwach braunen Längsbändern; Abdomen schwarz, mit roter Stielbasis und ca. ⅙ rotem Tergit-2-Endrand.

**Typen.** Holotypus: ♂ Messaure/Sv., 13.7.72, K. Müller (AEI). – Paratypus: 1♂, dto, 7.9.72.

Schweden.

### 7. *Mesochorus contractus*, spec. nov.

**Beschreibung.** ♂: 3.3 mm; Gesichtsränder konvergierend; Schläfe schmal, 0,5 Augenbreite; Ocellus < Vertexbrücke; Mesopleuren dicht und tief punktiert; Stigma verbreitert; Radialzelle breit und kurz; Scutellum mit senkrechtem Höcker; Griffel = Tarsus III, 2, dünn; Gesicht ganz gelb; Prothorax rot, übriger Thorax schwarz; Mesopleuren mit Rotschimmer; Abdomen schwarz, mit roter Stielbasis und ca. ⅕ gelbem Tergit-2-Endrand; folgende Tergite vespoid.

**Typen.** Holotypus: ♂ Varese (Istrien)/I, 6.75, E. Ratti (Ratti).

Via Tachinidae-Tönnchen, ex ? (Ra.)
Istrien.

### Sektion 5. *dispar*

**Diagnose.** 4 Merkmal-Kombination: ≤ 5 mm (nur *M. maximus* bis 5.5 mm) + Nervulus postfurkal + Areola sitzend + Bohrer lang, stabförmig.
Sekundärwirte: *Apanteles*, *Microgaster* (Braconidae).

### Bestimmungstabelle der Arten (♀♀)

| | | |
|---|---|---|
| 1(34) | Gesicht gebräunt oder geschwärzt | |
| 2(17) | Stielbasis rot | |
| 3(6) | Mesopleuren rot | |
| 4(5) | Länge 2.3-2.6 mm; Femur III hell | 1. *cognatus*, spec. nov. (S. 51) |
| 5(4) | Länge 3.8-4.5 mm; Femur III stark gebräunt | 2. *scaramozzinoi*, spec. nov. (S. 51) |
| 6(3) | Mesopleuren schwarz | |
| 7(12) | Coxa III schwarz oder verdunkelt | |
| 8(9) | Tergit-2-Ende bandförmig hell, Abdomen-Ende gelb | 3. *larentiae*, spec. nov. (S. 51) |
| 9(8) | Tergit-2-Ende bogenförmig hell; Abdomen-Ende nicht gelb | |
| 10(11) | Länge 2.6 mm; Coxa III schwarz | 4. *gibbosus*, spec. nov. (S. 52) |
| 11(10) | Länge 3.2-4 mm; Coxa III gebräunt | 5. *dispar* Brischke (S. 52) |
| 12(7) | Coxa III hell | |
| 13(14) | Tergit-3-Basis mit breitem gelbem Band | 6. *bulgaricus*, spec. nov. (S. 52) |
| 14(13) | Tergit-3-Basis mit gelber Mittellasche | |
| 15(16) | Postpetiolus glatt | 7. *albionis*, spec. nov. (S. 53) |
| 16(15) | Postpetiolus mit 2 breiten divergierenden Furchen | 8. *incisus*, spec. nov. (S. 53) |

17(2) Stielbasis schwarz

18(21) Schläfe = Augenbreite

19(20) Länge 5 mm; Bohrer = Tarsus III, 1 .................... 9. *maximus*, spec. nov. (S. 53)

20(19) Länge 3 mm; Bohrer > Tarsus III, 1 .................... 10. *lanceolatus*, spec. nov. (S. 53)

21(18) Schläfe < Augenbreite

22(23) Stigma hyalin .................... 11. *dumosus*, spec. nov. (S. 53)

23(22) Stigma hyalin-braun bis schwarzbraun

24(27) Bohrer > Tarsus III, 1

25(26) Coxa III hell .................... 12. *sawoniewiczi*, spec. nov. (S. 54)

26(25) Coxa III geschwärzt .................... 13. *perticatus*, spec. nov. (S. 54)

27(24) Bohrer ≤ Tarsus III, 1

28(29) Stigma verbreitert, schwarzbraun .................... 14. *jacobus*, spec. nov. (S. 54)

29(28) Stigma normal, heller braun

30(31) Coxa III hell oder leicht verdunkelt .................... 15. *anomalus* Holmgren (S. 54)

31(30) Coxa III geschwärzt

32(33) Postpetiolus apikal und Tergit 2 basal dunkel .................... 16. *acuminatus* Thomson (S. 54)

33(32) Postpetiolus apikal und Tergit 2 basal partiell gelb .................... 17. *betuletus*, spec. nov. (S. 55)

34(1) Gesicht hell (gelbrot)

35(38) Stielbasis schwarz

36(37) Bohrer = Tarsus III, 1; ab Tergit-5-Ende gelb .................... 18. *tumidus*, spec. nov. (S. 55)

37(36) Bohrer > Tarsus III, 1; ab Tergit-5-Ende braun .................... 19. *sulcatus*, spec. nov. (S. 55)

38(35) Stielbasis rot

39(44) Bohrer > Tarsus III, 1

40(41) Schläfe > Augenbreite .................... 20. *latus*, spec. nov. (S. 55)

41(40) Schläfe < Augenbreite

42(43) Tergit 3 ganz gelb .................... 21. *velox* Holmgren (S. 56)

43(42) Tergit 3 schwarz, mit basaler gelber Lasche .................... 22. *townesi*, spec. nov. (S. 56)

44(39) Bohrer ≤ Tarsus III, 1

45(48) Mesopleuren schwarz

46(47) Stigma klein und schmal; Tibia-III-Ende ⅕-⅙ schwarz .................... 23. *baueri*, spec. nov. (S. 56)

47(46) Stigma normal; Tibia-III-Ende ¼ schwarz .................... 24. *abraxator*, spec. nov. (S. 56)

48(45) Mesopleuren ganz oder partiell rot

49(50) Abdomen mit gelbweißer Spitze .................... 25. *pictilis* Holmgren (S. 57)

50(49) Abdomen ohne gelbweiße Spitze

51(52) Abdomen hinter Tergit einfarbig rot .................... 26. *gilvus*, spec. nov. (S. 57)

52(51) Abdomen hinter Tergit 3 nicht gelbrot

53(54) Abdomen hinter Tergit 3 vespoid .................... 27. *facialis* Bridgman (S. 57)

54(53) Abdomen hinter Tergit 3 schwarz .................... 28. *arietinus*, spec. nov. (S. 57)

**Bestimmungstabelle der Arten (♂♂)**

Merkmal-Kombination: 1 + 2 + 3 siehe ♀♀, 4. Merkmal: Griffel schlank, Länge ca. = Tarsus III, 2.

1(6) Griffel nadelspitz

2(3) Stielbasis breit rot .................... 30. *aculeatus*, spec. nov. (S. 58)

3(2) Stielbasis schwarz

4(5) Tergit-2-Ende und Tergit-3-Anfang mit einem gelben Band ...... 29. *pungens*, spec. nov. (S. 58)

5(4) Tergit-2-Ende mit gelbem Dreieck, Tergit-3-Basis mit gelber Lasche .................... 15. *anomalus* Holmgren (S. 54)

6(1) Griffel mit stumpfem Ende

7(18) Gesicht verdunkelt oder geschwärzt

8(9) Schläfe > Augenbreite, Länge 4.5-5.5 mm .................... 9. *maximus*, spec. nov. (S. 53)

9(8) Schläfe ≤ Augenbreite, < 4,5 mm

10(13) Stigma dunkelbraun

11(12) Mesopleuren gelbrot .................... 2. *scaramozzinoi*, spec. nov. (S. 51)

12(11) Mesopleuren schwarz .................... 31. *obscurus*, spec. nov. (S. 58)

13(10) Stigma (bräunlich-)hyalin

14(17) Coxa III verdunkelt

15(16) Tibia-III-Ende ⅙ geschwärzt .................... 10. *lanceolatus*, spec. nov. (S. 53)

16(15) Tibia-III-Ende ¼ geschwärzt .................... 3. *larentiae*, spec. nov. (S. 51)

17(14) Coxa III hell .................... 32. *luminis*, spec. nov. (S. 58)

18(7) Gesicht hell

19(26) Coxa III verdunkelt

20(21) Stielbasis rot; Schläfe = Augenbreite .................... 33. *pizzighettoneus*, spec. nov. (S. 58)

21(20) Stielbasis schwarz; Schläfe < Augenbreite

22(23) Stigma verbreitert, dunkelbraun .................... 34. *roccanus*, spec. nov. (S. 59)

23(22) Stigma normal, hyalin

24(25) Griffel > Tarsus III, 2 .................... 16. *acuminatus* Thomson (S. 54)

25(24) Griffel = Tarsus III, 2 .................... 4. *gibbosus* spec. nov. (S. 52)

26(19) Coxa III hell

27(32) Stielbasis schwarz

28(29) Stigma schwarzbraun .................... 35. *sordidus*, spec. nov. (S. 59)

29(28) Stigma hyalin

30(31) Länge 2.2 mm; Gesicht quadratisch .................... 36. *inversus*, spec. nov. (S. 59)

31(30) Länge 3.8 mm; Gesicht quer .................... 37. *tyroliensis*, spec. nov. (S. 59)

32(27) Stielbasis rot

33(36) Tergit-2-Ende bandförmig gelbrot

34(35) Thorax-Oberseite gelbrot .......... 21. *velox* Holmgren (S. 56)

35(34) Thorax-Oberseite schwarz .......... 25. *pictilis* Holmgren (S. 57)

36(33) Tergit-2-Ende bogenförmig oder dreieckig, gelbrot

37(40) Schläfe = Augenbreite

38(39) Länge 2.5 mm; Postpetiolus glatt .......... 1. *cognatus*, spec. nov. (S. 51)

39(38) Länge 3.3 mm; Postpetiolus längsgefurcht .......... 5. *dispar* Brischke (S. 52)

40(37) Schläfe < Augenbreite

41(42) Stigma braun .......... 27. *facialis* Bridgman (S. 57)

42(41) Stigma hyalin

43(44) Tergit 1 basal und opikal rot .......... 26. *gilvus*, spec. nov. (S. 57)

44(43) Tergit 1 nur basal rot .......... 23. *baueri*, spec. nov. (S. 56)

### 1. *Mesochorus cognatus*, spec. nov.

**Beschreibung.** ♀, ♂: 2.3-2.6 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Mesopleuren stark punktiert; Postpetiolus mit Rillen; Bohrer > Tarsus III, 1, schmal, unterseits zum Ende verjüngt; Griffel > Tarsus III, 2, dünn, gleich breit bleibend; Gesicht ♀ verdunkelt, ♂ hell; Prothorax rot; Meso- und Metathorax oberseits schwarz, Seiten rot; Scutellum ♀ braun, ♂ rot; Abdomen schwarz; Tergit 1 basal dunkelrot; Tergit-2-Ende bogenförmig ½ rotgelb, Tergit 3 basal mit ½ breiter rotgelber Lasche.

**Typen.** Holotypus: ♀, Gauting, Obb./D, 20.7.88, Ex *Apanteles*, Z 300, E. Haeselbarth (ZSM). – Paratypen: 1♀, 2♂♂, dto.

S-Deutschland.

### 2. *Mesochorus scaramozzinoi*, spec. nov.

**Beschreibung.** ♀, ♂: 3.8-4.5 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Mesopleuren grubig punktiert; Bohrer sehr dünn, am Ende verdünnt und etwas aufgebogen, ≥ Tarsus III, 1; Griffel dünn, > Tarsus III, 2; Gesicht gebräunt; Thorax schwarz, Mesoscutum-Makel + Scutellum + Metanotum-Absturz + Thorax-Seiten rot; Stigma dunkelbraun; Coxa III + Femur III verdunkelt; Tibia-II-Ende ¼ schwarz; Tergit 1 schwarz, mit dunkelroter Basis; Tergit 2 apikal ½ dreieckig gelb; Tergit 3 basal ¾ gelb; danach Abdomen gelb/braun, vespoid.

**Typen.** Holotypus: ♀, Sacro Monte di Crea (AL), Piemonte/I, 29.7.86, A. Scaramozzino (Scaramozzino). – Paratypen: 3♀♀, 2♂♂, dto.

N-Italien.

### 3. *Mesochorus larentiae*, spec. nov.

**Beschreibung.** ♀, ♂: 3.5-4 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Stigma lang und schmal; Bohrer relativ dick, am Ende aufgebogen, < Tarsus III, 1; Gesicht gebräunt; Thorax schwarz; Stigma haylin; Coxa III gebräunt; Tibia-III-Ende ¼ geschwärzt; Abdomen schwarz, mit gelber Spitze; Tergit 1 basal gelbrot; Tergit-2-Ende ⅕ bandförmig gelb; Tergit 3 von Basis aus ⅔ keilförmig gelbrot; ♂ wie ♀, aber: Thorax Seite rotgelb; Tergit-3-Keil nur ⅓; Abdomen-Spitze dunkel; Griffel dünn, = Tarsus III, 2.

**Typen.** Holotypus: ♀, Rauchenbühel, Salzburg/A, 10.9.88, M. Schwarz (Schwarz). – Paratypen: 1♂, Timmendorf, Ostsee/D, v. Ghika (ZSM); 1♂, Taufkirchen, Obb./D, 6.67, W. Schwenke (ZSM); 2♂♂, Kassel/D, R. Hinz (ZSM).

Ex *Larentia, Habryntis* (Geometridae) via *Apanteles* (Braconidae) (Hz.).
M-Europa.

### 4. *Mesochorus gibbosus*, spec. nov.

**Beschreibung.** ♀: 2.5 mm; s. Sektions-Merkmale; Kopf kurz und breit; Schläfe < Augenbreite; Gesicht gewölbt, unter den Fühlern mit erhabenem Feld, in der Mitte mit Längsfurche; Bohrer = Tarsus III, 1; Gesicht verdunkelt; Thorax schwarz; Stigma bräunlich-hyalin; Coxa III verdunkelt; Abdomen schwarz; Tergit 1 basal rot; Tergit 2 apikal ⅔ bogenförmig gelb; Tergit 3 basal 1/8 bandförmig gelb, danach ⅓ bandförmig braun.

♂ wie ♀, aber: Gesicht gelbrot; erhabenes Feld unter den Fühlern weniger ausgeprägt; Thorax-Oberseite braunrot, mit gelber Makel; Thorax-Seiten rotgelb; Stigma hyalin; Abdomen schwarz; Tergit 1 apikal mit gelbem Endfleck; Tergit 2 gelb, mit dunklem Seitenfleck; Tergit 3 basal ⅓ bandförmig gelb; Griffel = Tarsus III, 2.

**Typen.** Holotypus: ♀, Oppach, Thür./D, 2,2 km NNE, 12.8.93, Nr. 294/93, H. Zoerner (DEI). – Paratypen: 1♂, Roßlau/D, via *Microplitis*-Kokon an *Rubus* sp., W. Schwenke (ZSM); 3♂♂, Dessau/D, H. Zoerner (DEI).

M-Deutschland.

### 5. *Mesochorus dispar* Brischke

*Mesochorus dispar* Brischke, 1880: 190, ♀♂.

**Diagnose.** ♀: 3.2-4.0 mm; s. Sektions-Mermale; Schläfe < Augenbreite; Stigma klein; Postpetiolus mit Längsrillen; Bohrer > Tarsus III, 1. Gesicht geschwärzt; Stigma bräunlich-hyalin; Thorax schwarz; Coxa III verdunkelt; Abdomen schwarz; Tergit 1 basal dunkelrot; Tergit 2 apikal ½ dreieckig gelb; Tergit 3 basal ½-⅔ bandförmig gelb.

♂ wie ♀, aber: Gesicht gelb; Thorax Seiten gelbrot; Stigma hyalin; Coxa (fast) hell; Griffel etwas > Tarsus III, 2.

**Typen.** Verschollen.

Ex *Cucullia* (Noctuidae), *Harpyia, Lophopteryx* (Notodontidae) via *Apanteles, Microgaster* (Braconidae), *Smerinthus* (Sphingidae) (Hz., Bri. Schw.).
Fundorte in Polen, Deutschland, Tschechien, Österreich, N-Italien.
M-Europa.

### 6. *Mesochorus bulgaricus*, spec. nov.

**Beschreibung.** ♀: 4 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Mesopleuren grob punktiert; Bohrer = Tarsus III, 1. Gesicht etwas verdunkelt; Thorax schwarz; Stigma braun; Tibia-III-Ende ⅙ schwarz; Abdomen schwarz; Tergit 1 basal dunkelrot; Tergit 2 apikal ½ bogenförmig gelb; Tergit 3 basal ⅔ bandförmig gelb.

**Typen.** Holotypus: ♀, Batak/Bulg., 2.7.70, R. Hinz (ZSM).

SE-Europa.

### 7. *Mesochorus albionis*, spec. nov.

**Beschreibung.** ♀: 4 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Bohrer < Tarsus III, 1; Gesicht verdunkelt; Thorax schwarz; Mesoscutum mit braunen Wischen; Tibia-III-Ende ⅓ geschwärzt; Abdomen schwarz; Tergit-1-Basis dunkelrot; Tergit-2-Ende mit ⅒ gelbem Band; Tergit 3 basal mit ⅙ gelbem Band, das sich in der Mitte bis ⅓ vorwölbt.

**Typen.** Holotypus: ♀, Oxford/UK, 8.81, C 12, Denis Owen (AEI). – Paratypen: 2♀♀, dto.

England.

### 8. *Mesochorus incisus*, spec. nov.

**Beschreibung.** ♀: 2.8 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Postpetiolus auffallend groß, mit 2 großen divergierenden Gruben; Bohrer gerade, zum Ende verdünnt, > Tarsus III, 1; Gesicht verdunkelt; Thorax und Abdomen schwarz; Tergit 1 basal dunkelrot; Tergit 2 apikal mit ¼ gelbem Band; Tergit 3 basal mit ¾ rötlicher Zunge.

**Typen.** Holotypus: ♀, Gabcikovo /ČSFR, 9.57, M. Capek (Capek).

Via *Apanteles* (Braconidae) (Cap.).
Tschechien.

### 9. *Mesochorus maximus*, spec. nov.

**Beschreibung.** ♀: 4.8-5.5 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Mesopleuren stark punktiert; Flügelgeäder auffällig dick, braun; Bohrer = Tarsus III, 1; Gesicht dunkel; Thorax schwarz; Prothorax und Mesopleuren rot und schwarz; Stigma graubraun; Femur III gebräunt; Abdomen schwarz; Tergit 1 apikal schmal gelbrot; Tergit 2 apikal ½ bogenförmig gelbrot; Tergit 3 basal ½ gelbrot.
♂ wie ♀, aber: Gesicht hell; Prothorax rotgelb; Griffel = Tarsus III, 2.

**Typen.** Holotypus: ♀, Einbeck/D, 7.7.68, R. Hinz (ZSM). – Paratypen: 2♂♂, Harz/D, 3♂♂, Einbeck/D, R. Hinz (ZSM).

N-Deutschland.

### 10. *Mesochorus* lanceolatus, spec. nov.

**Beschreibung.** ♀, ♂: 3 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer sehr lang und dünn, = Tarsus III, 1 und ½ 2; Griffel > Tarsus III, 2; Gesicht schwarz (♀), braun (♂), mit breiten roten Orbiten; Thorax und Abdomen schwarz; Stigma bräunlich-hyalin; Tibia-III-Ende ⅙ geschwärzt; Coxa II schwach, Coxa III stark verdunkelt; Tergit 2 apikal ½ bogenförmig gelbrot; Tergit 3 basal ⅔ laschenförmig rötlich.

**Typen.** Holotypus: ♀ Messaure/S, 22.9.72, K. Müller (AEI). – Paratypen: 1♀, 2♂♂, dto.

Schweden.

### 11. *Mesochorus dumosus*, spec. nov.

**Beschreibung.** ♀: 3.1 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Stigma schmal; Bohrer = Tarsus III, 1; Gesicht unter den Fühlern verdunkelt; Thorax schwarz; Stigma hyalin; Coxa III verdunkelt; Abdomen schwarz; Tergit-2-Endrand schmal (⅒) gelbrot; Tergit 3 basal bogenförmig ⅕ gelbrot.

**Typen.** Holotypus: ♀, Messaure/S, 6.7.72, K. Müller (AEI).

Schweden.

### 12. *Mesochorus sawoniewiczi*, spec. nov.

**Beschreibung.** ♀: 4.3 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Stigma vergrößert; Bohrer > Tarsus III, 1; Gesicht schwarz, mit schmalen roten Orbiten; Thorax schwarz; Stigma schwarzbraun; Coxa III rot; Abdomen schwarz; Tergit 2 rotbraun; Tergit 3 bis Ende dunkel vespoid (braun/schwarz).

**Typen.** Holotypus: ♀, Polen, Nr. 258, J. Sawoniewicz (Warschau).

Polen.

### 13. *Mesochorus perticatus*, spec. nov.

**Beschreibung.** ♀: 4.2 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Postpetiolus gerieft; Bohrer > Tarsus III, 1; Gesicht schwarz, mit breiten rotgelben Orbiten; Thorax schwarz; Stigma dunkelbraun; Coxa III stark gebräunt; Abdomen schwarz; Tergit 2 apikal bandförmig ¼ rotgelb; Tergit 3 basal laschenfrömig ¾ rotgelb.

**Typen.** Holotypus: ♀, Oxford/UK, 6.80, C 40, Denis Owen (AEI).

England.

### 14. *Mesochorus jacobus*, spec. nov.

**Beschreibung.** ♀: 4.8 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Postpetiolus und Tergit 2 mit Längs-Eindruck; Bohrer < Tarsus III, 1; Gesicht schwarz, mit mäßig breiten roten Orbiten; Thorax schwarz; Stigma schwarzbraun; Coxa III geschwärzt; Tibia-III-Ende ¼ geschwärzt; Abdomen schwarz, mit gelbrotem Sanduhr-Fleck von Tergit-2-Endrand bis Tergit-3-Mitte.

**Typen.** Holotypus: ♀, Vollershof b. St. Jacob, Salzburg/A, 26.9.86, M. Schwarz (Schwarz).

W-Österreich.

### 15. *Mesochorus anomalus* Holmgren

*Mesochorus anomalus* Holmgren, 1858: 130, ♀ ♂.

**Diagnose.** ♀: 3.2-4 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer = Tarsus III, 1; Gesicht ± gebräunt; Thorax schwarz; Stigma dunkelbraun; Tibia III weiß, apikal ⅓ geschwärzt; Coxa III hell oder leicht verdunkelt; Abdomen schwarz; Tergit-2-Ende ½ dreieckig gelbrot; Tergit 3 basal ½-¾ laschenförmig gelbrot.

♂ wie ♀, aber: Gesicht manchmal hell; Thorax-Seiten rotgelb; Coxa III hell; Stigma etwas heller braun; Griffel > Tarsus III, 2, nadelspitz.

**Typen.** Lectotypus: ♀, Hinz 1962 (Stockholm).

Ex *Cucullia* (Noctuidae) und *Argynnis* (Nymphalidae) via *Microgaster* (Brischke); ex *Euchelia* (Arctiidae) via *Apanteles* (Braconidae) (Schmied.); ex Geometridae-Raupe an *Salix* via *Apanteles* (Schw.); ex *Abraxas* (Geometridae) (Cap.).
Fundorte in Schweden bis Tschechien, N-Italien und N-Frankreich.
N- und M-Europa.

### 16. *Mesochorus acuminatus* Thomson

*Mesochorus acuminatus* Thomson, 1885: 343, ♀ ♂.

**Diagnose.** ♀: 3-4 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Stigma verschmälert; Bohrer = Tarsus III, 1; Gesicht schwarz, mit schmalen roten Orbiten; Thorax und Abdomen schwarz; Stigma

schmutzig hyalin; Coxa II schwach-, Coxa III stark-verdunkelt; Tergit-2-Ende ⅓ bogenförmig rotgelb; Tergit 3 basal ⅔ dto

♂ wie ♀, aber: Gesicht und Thorax-Seiten gelbrot; nur Coxa III schwach verdunkelt; Griffel > Tarsus III, 2.

**Typen.** Lectotypus: ♀, Schwenke 1968 (UZI Lund).

Fundorte in Schweden, Polen, Deutschland, Tschechien, Alpenländer, N-Frankreich.
N- und M-Europa.

### 17. *Mesochorus betuletus*, spec. nov.

**Beschreibung.** ♀: 4.8 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Bohrer < Tarsus III, 1, breit-stabförmig; Gesicht schwarz, mit breiten roten Orbiten; Thorax schwarz; Stigma schwarzbraun; Coxa III geschwärzt; Tibia-III-Ende ⅓ schwarz; Abdomen schwarz; Tergit-1-Ende mit rotem Mittelfleck; Tergit 2 basal mit je einem gelben Seitenfleck, apikal mit ⅓ gebogener gelber Binde; Tergit 3 braun, mit apikaler Mittellasche bis ½; Tergite 4 und folgende rot/braun vespoid.

**Typen.** Holotypus: ♀, Etzenricht, Bay./D, 9.66, W. Schwenke (ZSM).

Ex Geometridae-Raupe an *Betula* via Ichneumonidae-Kokon mit schwarz-weiß-schwarzer Mittelbinde (Schw.).
S-Deutschland.

### 18. *Mesochorus tumidus*, spec. nov.

**Beschreibung.** ♀: 3.5 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Augenränder divergierend; Stigma verbreitert; Bohrer = Tarsus III, 1; Gesicht gelb, mit weißen Orbiten; Thorax schwarz, Seiten gelbrot und schwarz; Stigma hyalin; Abdomen schwarz; Tergit-2-Ende ⅙ bandförmig gelb; Tergit 3 ganz gelb; ab Tergit 5 bis Ende apikale Hälfte jeweils gelb.

**Typen.** Holotypus: ♀, Polen, Nr. 151 (Warschau).

Polen.

### 19. *Mesochorus sulcatus*, spec. nov.

**Beschreibung.** ♀: 4 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Bohrer > Tarsus III, 1; Gesicht gelbrot, mit weißen Orbiten; Thorax oben schwarz, seitlich rot + braun; Abdomen schwarz; Tergit-2-Ende ⅓ bogenförmig gelb; Tergit-3-Basis ⅔ laschenförmig gelb, sonst braunrot; ab Tergit 4 braun/rot vespoid.

**Typen.** Holotypus: ♀, Leicester/UK, 11.73, Jennifer Owen (AEI).

England.

### 20. *Mesochorus latus*, spec. nov.

**Beschreibung.** ♀: 3 mm; s. Sektions-Merkmale; Schläfe > Augenbreite; Bohrer > Tarsus III, 1; Gesicht weiß; Thorax schwarz, Propleuren gelb; Stigma schmutzig-hyalin; Coxa III verdunkelt; Abdomen schwarz; Tergit-1-Basis dunkelrot; Tergit-2-Ende ⅛ bandförmig gelb; ab Tergit 3 braun, mit schmalen gelben Endrändern.

**Typen.** Holotypus: ♀, Oxford/UK, 9.81, C 12, Denis Owen (AEI). – Paratypus: 1♀, dto., C 40, 7.81.

England.

### 21. *Mesochorus velox* Holmgren

*Mesochorus velox* Holmgren, 1858: 127, ♀ ♂.

**Diagnose.** ♀: 3-3.5 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Stigma verbreitert; Bohrer > Tarsus III, 1; Prothorax rot; Meso- und Metathorax oben schwarz(-braun), seitlich rot; Mesoscutum mit gelbroter U-förmiger Makel; Scutellum mit 2 gelben Streifen; Metanotum-Absturz rot; Abdomen schwarz; Tergit-1-Basis rot; Tergit-2-Ende mit ⅓ rotem Band; folgende Tergite gelbrot.

♂ wie ♀, aber: Thorax oben rotgelb; Abdomen überwiegend gelblich; Griffel ≥ Tarsus III, 2.

**Typen.** Coll. Holmgren (Stockholm).

Fundorte in Schweden und Deutschland.
N- und M-Europa.

### 22. *Mesochorus townesi*, spec. nov.

**Beschreibung.** ♀: 3 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Stigma verbreitert; Postpetiolus gerieft; Bohrer > Tarsus III, 1; Thorax schwarz, nur Prothorax überwiegend rot; Stigma schmutzig-hyalin; Abdomen schwarz; Tergit-1-Basis dunkelrot; Tergit-2-Ende ⅙ bandförmig gelb; Tergit 3 von Basis bis Mitte laschenförmig gelb.

**Typen.** Holotypus: ♀, Moskau/USSR, 4.8.68, H. & M. Townes (AEI).

Europ. Rußland.

### 23. *Mesochorus baueri*, spec. nov.

**Beschreibung.** ♀: 3.5 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Stigma klein, hyalin; Postpetiolus und Tergit 2 mit Längsgrube; Bohrer = Tarsus III, 1; Thorax schwarz(-braun), mit roter Mesoscutum-Makel; Scutellum z.T. rot; Abdomen schwarz; Tergit 1 basal rot; Tergit 2 apikal ½ bogenförmig gelb; Tergit 3 basal ¾ bandförmig gelb; folgende Tergite braun/gelbrot vespoid.

♂ wie ♀, aber: Pro- und Mesothorax rot; Mesoscutum mit braun gesäumter gelber Makel; Griffel = Tarsus III, 2.

**Typen.** Holotypus: ♀, Polen (Ort ?), 7.58, Hartmann, Ex *Zygaena* via *Microgaster*, coll. E. Bauer (ZSM). – Paratypen: 7♀♀, 3♂♂, dto; 1♀, Muldenstein/D, H. Zoerner (DEI); 1♀, Rivalta, Piem./I, G. Brussino; 1♀, Condova, Piem./I, A. Scaramozzino (Scaramozzino).

Polen, Deutschland, N-Italien.

### 24. *Mesochorus abraxator*, spec. nov.

**Beschreibung.** ♀: 4 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Postpetiolus und Tergit-2-Anfang mit länglicher Grube; Bohrer < Tarsus III, 1, zum Ende unterseits verjüngt; Thorax schwarz, Prothorax rot; Mesoscutum mit 2 roten Striemen; Stigma hyalin-braun; Tibia-III-Ende ¼ schwarz; Abdomen schwarz; Tergit-1-Basis rot; Tergit-2-Ende bogenförmig gelb; Tergit 3 bis ½ mit gelber Mittellasche.

**Typen.** Holotypus: ♀, Gabcikovo/ČSFR, 23.-30.5.57, Capek (Capek). – Paratypus: 1♀, dto.

Ex *Abraxas* (Geometridae) (Cap.)
Tschechien.

## 25. *Mesochorus pictilis* Holmgren

*Mesochorus pictilis* Holmgren, 1858: 131, ♀ ♂.

**Diagnose.** ♀: 3.0-3.7 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; innere Augenränder divergierend; Postpetiolus und Tergit 2 mit flacher Grube; Bohrer < Tarsus III, 1; Gesicht weißlich; Thorax-Oberseite schwarz, Seiten rot; Stigma hyalin; Abdomen schwarz; Tergit-1-Basis dunkel; Tergit 2 apikal ⅙ bandförmig gelb; Tergit 3 basal ½ bandförmig gelb; Abdomenspitze gelb.

♂ wie ♀, aber: Tergit 1 basal rot; Tergit 3 fast ganz gelb; Griffel etwas > Tarsus III, 2.

**Typen.** Coll. Holmgren (Stockholm).

Ex *Taeniocampa* (Lymantriidae) via Braconidae (Hz.); ex Geometridae an *Salix* via *Apanteles* (Braconidae) (Schw.); ex *Bupalus* (Geometridae) via *Apanteles* (Braconidae) (Schw.).
Fundorte in Schweden, Polen, Deutschland, Österreich.
N- und M-Europa.

## 26. *Mesochorus gilvus*, spec. nov.

**Beschreibung.** ♀, ♂: 3.3-3.5 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Tergit-2-Mitte flach eingedrückt; Bohrer = Tarsus III, 1; Griffel = Tarsus III, 2; Thorax gelbrot, mit Verdunklungen auf Mesoscutum und Metanotum; Stigma hyalin; Abdomen schwarz; Tergit 1 basal und apikal rot; Tergit 2 apikal ⅔ bogenförmig gelbrot; Tergit 3 ganz gelbrot; Tergit 4 bis Spitze braun.

**Typen.** Holotypus: ♀, Guttau, Thür./D, 7.86, Nr. 4295, H. Zoerner (DEI). – Paratypen: 3♀♀, dto.; 1♀, 1♂, Gollnow, Pomm/PL, S. Lüderwald (Warschau); 1♀, Giaglione, To./I, 630 m, R. Bassi (Scaramozzino).

M-Europa (S-Polen bis N-Italien).

## 27. *Mesochorus facialis* Bridgman

*Mesochorus facialis* Bridgman, 1884: 431, ♀ ♂.

**Diagnose.** ♀, ♂: 3.5-4 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Mesopleuren grob punktiert; Bohrer = Tarsus III, 1, zum Ende schmaler; Griffel = Tarsus III, 2; Thorax braun(-schwarz); Mesoscutum-Makel, Scutellum, Metanotum-Apikalhälfte und Thorax-Seiten rot; Stigma grau- bis schwarzbraun; Tibia-III-Ende ¼-⅓ schwarz; Abdomen schwarz; Tergit-2-Ende ca. ½ bogenförmig oder dreieckig rotgelb; ab Tergit 3 rotgelb, mit braunen Bändern.

**Typen.** Verschollen.

Ex *Plutella* (Plutellidae) via *Apanteles* (Braconidae) und *Angitia* (Ichneumonidae), (Delucchi et al. 1954).
Fundorte in Schweden, Dänemark, England, Deutschland, Jugoslawien.
Europa.

## 28. *Mesochorus arietinus*, spec. nov.

**Beschreibung.** ♀: 3 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Bohrer = Tarsus III, 1, etwas säbelförmig; Thorax gelbrot, mit braunem Metanotum und braunen Flecken auf Mesoscutum und Mesopleuren; Stigma hyalin-braun; Tibia-III-Ende ⅕ geschwärzt; Abdomen schwarz; Tergit-1-Basis rot; Tergit 2 apikal ⅔ gelblich; Tergit 3 basal ½ rot.

**Typen.** Holotypus: ♀, Bela/ČSFR, 1970 (Capek).

Ex *Zygaena spinephialtes*. Capec (Capek).
Tschechien.

### 29. *Mesochorus pungens*, spec. nov.

**Beschreibung.** ♂: 3.5 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Postpetiolus gerunzelt; Griffel = Tarsus III, 2, nadelspitz; Prothorax gelb; Meso- und Metathorax Oberseite schwarz, Seiten gelb; Mesoscutum mit ausgedehntem roten Fleck; Abdomen schwarz; Tergit 2 apikal mit ⅓ gelbem Band; Tergit 3 basal mit ½ gelbem Band.

**Typen.** Holotypus: ♂, Dessau/D, Nr. 167/88, 4.7.88, H. Zoerner (DEI).

M-Deutschland.

### 30. *Mesochorus aculeatus*, spec. nov.

**Beschreibung.** ♂: 3.2 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Pro- und Mesothorax, seitlich betrachtet, quadratisch; Stigma verlängert; Griffel > Tarsus III, 2, nadelspitz; Prothorax rot, Meso- und Metathorax schwarz; Mesoscutum mit rotem H-Fleck; Stigma hyalin, schwach gebräunt; Tibia-III-Ende ¼ geschwärzt; Abdomen schwarz; Tergit 1 mit roter Basis und rotem Apikalfleck; Tergit 2 apikal ⅔ bogenförmig gelbrot; Tergit 3 basal ¾ bogenförmig gelbrot.

**Typen.** Holotypus: ♂, Haut Rhin/F, Chalampi, 10.5.31, A. Seyrig (Paris).

Frankreich.

### 31. *Mesochorus obscurus*, spec. nov.

**Beschreibung.** ♂: 3.1 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Griffel > Tarsus III, 2, dünn; Gesicht verdunkelt; Thorax schwarz; Prothorax rot gefleckt; Stigma graubraun; Coxa III verdunkelt; Femur III gebräunt; Tibia-III-Ende ⅛ gebräunt; Abdomen schwarz; Tergit-2-Ende ⅕ bandförmig gelb; Tergit 3 in Mitte durchgehend rot.

**Typen.** Holotypus: ♂, Dessau/D, 1,3 km SE, 15.9.93, Nr. 347/93, H. Zoerner (DEI).

M-Deutschland.

### 32. *Mesochorus luminis*, spec. nov.

**Beschreibung.** ♂: 3 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Griffel etwas > Tarsus III, 2; Thorax gelbrot, mit braunen Flecken auf Mesonotum, Mesopleuren und basalem Teil des Metanotums; Stigma hyalin; Abdomen schwarz; Tergit 1 basal rot; Tergit 2 apikal ¼ bandförmig gelb; Tergit 3 ganz rotgelb; folgende Tergite dunkelbraun.

**Typen.** Holotypus: ♂, Wittenberg/D, 10.-30.8.64, Lichtfalle, H. Zoerner (DEI).

M-Deutschland.

### 33. *Mesochorus pizzighettoneus*, spec. nov.

**Beschreibung.** ♂: 3 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Griffel < Tarsus III, 2; Gesicht gelbweiß; Thorax schwarz; Prothorax gelb; Mesoscutum basal gelb, apikal braun; Stigma hyalin; Coxa III dunkel; Tibia-III-Ende ⅙ gebräunt; Abdomen schwarz; Tergit 1 mit roter Basis; Tergit 2 mit schmalem gelbem apikalem Rand; Tergit 3 mit gelber Lasche.

**Typen.** Holotypus: ♂, Pizzighettone/I, 5.3.73, F. Frilli (Scaramozzino).

Italien.

### 34. *Mesochorus roccanus*, spec. nov.

**Beschreibung.** ♂: 3.5 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Stigma verbreitert; Tergit 1 durchgehend mit Längsfurche; Griffel = Tarsus III, 2; Gesicht gelb, mit breiten weißen Orbiten; Prothorax rot; Mesoscutum schwarz, mit rotem Latzfleck; Scutellum rot; Mesopleuren rot, braun gefleckt; Metathorax schwarz; Stigma schwarzbraun; Coxa III verdunkelt; Tibia-III-Ende ⅕ schwarz; Abdomen schwarz; Tergit 2 apikal ⅕ bogenförmig gelb; Tergit 3 basal ⅔ bogenförmig gelbrot; übriges Abdomen braun/gelbrot vespoid.

**Typen.** Holotypus: ♂, Garda Rocca/I, VR, 100-250 m, 20.5.83, E. Haeselbarth (ZSM).

N-Italien.

### 35. *Mesochorus sordidus*, spec. nov.

**Beschreibung.** ♂: 3.5 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Mesopleuren stark punktiert; Stigma verbreitert; Griffel = Tarsus III, 2; Gesicht weiß; Thorax schwarz; Prothorax und Mesopleuren rot und schwarz; Mesoscutum mit braunen Wischen; Tibia-III-Ende ¼-⅓ geschwärzt; Stigma schwarzbraun, Abdomen schwarz; Tergit 2 apikal mit sehr schmalem rotem Band; Tergit 3 gelbrot, mit schwarz-verschwommener Mitte.

**Typen.** Holotypus: ♂, Oppach, Thür./D, 1,2 km O; 10.6.93, Nr. 174/93, H. Zoerner (DEI).

M-Deutschland.

### 36. *Mesochorus inversus*, spec. nov.

**Beschreibung.** ♂: 2.1 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Gesicht quadratisch; Griffel etwas > Tarsus III, 2; Gesicht weißgelb; Thorax rotbraun; Prothorax, Mesopleuren und Scutellum gelbrot; Stigma hyalin; Tibia-III-Ende ¼ gebräunt; Abdomen schwarz; Tergit 1 apikal rot; Tergit 2 apikal mit ⅛ gelbem Band; Tergit 3 basal mit gelbem Dreieck bis zur Mitte; Tergit 4 basal mit ¼ gelber Lasche.

**Typen.** Holotypus: ♂, Gröbenzeller Moor b. München/D, 8.80, W. Schwenke (ZSM); via *Apantelus*-Kokon an *Betula*-Blatt (Schw.).

S-Deutschland.

### 37. *Mesochorus tyroliensis*, spec. nov.

**Beschreibung.** ♂: 3.5 mm; s. Sektions-Merkmale; Schläfe = Augenbreite; Mesopleuren stark punktiert; Postpetiolus mit Längsgrube; Griffel = Tarsus III, 2; Gesicht gelbrot; Thorax schwarz; Prothorax rot; Mesoscutum und Scutellum schwarz und rot; Meso- und Metapleuren rot; Stigma hyalin; Tibia-III-Ende ⅐ geschwärzt; Abdomen schwarz; Tergit 2 apikal breit, undeutlich rötlich; Tergit 3 basal ½ bogenförmig gelbrot; Abdomenspitze gelb.

**Typen.** Holotypus: ♂, Walchsee, Tirol/A, 800 m, 4.6.68, E. Haeselbarth (ZSM).

Österr. Alpen.

## Sektion 6. *sylvarum*

**Diagnose.** ♀ Bohrer sehr kurz (= Tarsus III, 1) und breit, zungenförmig. ♂ Griffel robust und nadelspitz, > Tarsus III, 2, (braun-)schwarz (Abb. 2A).

Von den Mesochorinae-♂♂ mit spitzem Griffel und mehr als 4 mm Körperlänge haben nur die ♂♂ der *M.-sylvarum*-Sektion keine schwarzen, sondern rote Metapleuren.
Die Sektion gründet sich auf die von allen *Mesochorus*-Arten grundlegend abweichende Bohrer-Form.

**Bestimmungstabelle der Arten (♀♀)**

1(2) Stigma weiß irisierend; Ocellen 0,65 der Vertexbrücke; Bohrer-Seiten parallel ........................................ 1. *campestris*, spec. nov. (S. 60)

2(1) Stigma nicht irisierend; Ocellen 0,8-1,0 der Vertexbrücke; Bohrer-Seiten konvex

3(4) Länge 4.2-5.8 mm; Schläfe < Wangenbreite; Stigma gleichseitig ........................................ 2. *sylvarum* Curtis (S. 60)

4(3) Länge 6.3-9.0 mm; Schläfe = Augenbreite; Stigma ungleichseitig

5(6) Körper i. M. kleiner, graziler; Bohrer schmaler, 3.5 mal so lang wie breit (Abb. 2A) ........................................ 3. *anthracinus* Kriechbaumer (S. 61)

6(5) Körper i. M. größer, robust; Bohrer breiter, nur 3 mal so lang wie breit

7(8) Frontalorbiten breit weiß; Abdomen-Mitte rot ........................................ 4. *pini*, spec. nov. (S. 61)

8(7) Frontalorbiten schmal rötlich; Abdomen-Mitte schwarz .............. 5. *eichhorni*, spec. nov. (S. 61)

**Bestimmungstabelle der Arten (♂♂)**

1(2) Schläfe < Augenbreite; Stigma gleichseitig ........................................ 2.*sylvarum* Curtis (S. 60)

2(1) Schläfe ≥ Augenbreite; Stigma ungleichseitig

3(4) Frontalorbiten schwarz; Stiel > 4mal so lang wie breit ................ 6. *svenssoni*, spec. nov. (S. 61)

4(3) Frontalorbiten weiß; Stiel < 4mal so lang wie breit

5(6) Pro- und Mesonotum schwarz ........................................ 3. *anthracinus* Kriechbaumer (S. 61)

6(5) Pro- und Mesonotum rot und braun

7(8) Abdomen ab Mitte weigehend rot ........................................ 4. *pini*, spec. nov. (S. 61)

8(7) Abdomen schwarz ........................................ 5.*eichhorni*, spec. nov. (S. 61)

### 1. *Mesochorus campestris*, spec. nov.

**Beschreibung.** ♀: 3.8 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Ocellen ca. ⅔ der Vertexbrücke; Bohrer parallel-seitig; Gesicht schwarz, Clypeus und Orbiten gelbrot; Thorax schwarz; Pro- und Mesopleuren rot; Mesoscutum mit 2 bräunlichen Längsstreifen; Stigma hyalin, weiß irisierend; Tibia-III-Ende schmal, ca. 1/12 verdunkelt; Abdomen schwarz; Tergit 2 mit sehr schmalem gelbem Endrand.

**Typen.** Holotypus: ♀, Niedzwiady at Miastiko:B., Bsw./PL, 31.3.-8.11.74, IOLID, AR, leg. Ekipa (Warschau).

Polen.

### 2. *Mesochorus sylvarum* Curtis

*Mesochorus sylvarum* Curtis, 1833: 404, ♀.
*Mesochorus atriventris* Cresson, 1872: 262, 21, ♂; syn. Dasch, 1971, Z37.

**Diagnose.** ♀, ♂: 4.2-5.8 mm; s. Sektions-Merkmale; Schläfe < Augenbreite; Ocellen 0,8-1,0 der Vertexbrücke; Bohrer konvex-seitig; Gesicht schwarz (braun) ♀, gelb ♂, Orbiten gelbweiß; Thorax schwarz, beim ♀ mit braun-geflecktem Mesoscutum, beim ♂ mit roten Pleuren; Stigma hyalin; Tibia-III-Ende ca.

$^{1}/_{12}$ verdunkelt; Abdomen schwarz; Tergit-2-Endrand schmal weißlich; die folgenden Tergit-Enden schmal gebräunt.

**Typen.** Holotypus: ♀, England, Dasch 1971, 237.

Ex *Spilonota* (Tortricidae) via *Campoplex* (Ichneumonidae) an *Sorbus* (Schw.).
Fundorte in allen Teilen Europas und mehreren Teilen Asiens sowie N-Amerikas.
Europa, Asien, N-Amerika.

### 3. *Mesochorus anthracinus* Kriechbaumer

*Mesochorus anthracinus* Kriechbaumer, 1890: 484, W.

**Diagnose.** ♀: 7.4-8.1 mm; s. Sektions-Merkmale; Körper grazil; Schläfe = Augenbreite; Ocellen ¾-1 Vertexbrücke; Bohrer konvex (Abb. 1A); Gesicht geschwärzt, mit weißen Orbiten; Thorax schwarz; Mesoscutum und Scutellum mit 2 schwachen rötlichen Wischen; Mesopleuren manchmal ± rötlich; Stigma gelblich- bis bräunlich-hyalin; Tibia-III-Ende ca. $^{1}/_{12}$ verdunkelt; Abdomen schwarz, mit sehr schmalen Tergit-Endrändern.

♂ (neu): Griffel s. Abb. 2A; Färbung wie ♀, aber: Gesicht gelb; Pro-, Meso- und Metapleuren rot.

**Typen.** Holotypus: ♀, St. Egyd, Nieder-Österr./A, 1884, Kriechbaumer (Wien).

Ex *Lobophora* (Geometridae) via *Campoplex* (Ichneumonidae) (Kriech.); ex *Tortrix* (Tortricidae) via *Phytodietus* (Ichneumonidae) (Horstm.).
Europa.

### 4. *Mesochorus pini*, spec. nov.

**Beschreibung.** ♀, ♂: 7.5-9.0 mm; s. Sektions-Merkmale; Körper etwas robuster als *anthracinus*, doch nicht so kompakt wie bei *eichhorni*; Schläfe ≥ Augenbreite; Ocellen 0,8-1,0 der Vertexbrücke; Area postica groß, rechteckig, glatt; Bohrer ca. 4mal so lang wie breit, Seiten konvex; Färbung wie anthracinus, aber ♀ Mesoscutum-Fleck heller rot; Scutellum fast ganz rot; Stigma bräunlich-hyalin; Tibia-III-Ende ½ geschwärzt; Tergit-2-Ende mit schmalem weißem Rand.
♂ wie ♀, aber Tergite 3 und folgende überwiegend rot.

**Typen.** Holotypus: ♀, Heideck, N-Bayern/D, 5.72, W. Schwenke (ZSM). – Paratypen: 3♂♂, dto.

Ex *Panolis flammea* (Noctuidae) via Ichneumonidae (Schw.)
Europa (Kiefernwälder).

### 5. *Mesochorus eichhorni*, spec. nov.

**Beschreibung.** ♀, ♂: 7.0-7.9 mm; s. Sektions-Merkmale; Schläfe ≥ Augenbreite; Ocellen 0,8-1,0 der Vertexbrücke; Area postica kleiner und runder als bei *pini*, gerunzelt; Bohrer ca. 3,5mal so lang wie breit, Seiten konvex; Färbung wie *pini*, aber ♀ Frontalorbiten rot, Tergit-2-Ende mit schmalem rötlichem Band; ♂ Abdomen ganz schwarz.

**Typen.** Holotypus: ♀, Woringen, Allgäu, Bayern/D, 7.68, W. Schwenke (ZSM). – Paratypen: 3♀♀, 3♂♂, dto.

Ex *Cephalcia abietis* (Tenthredinidae.) via Ichneumonidae (Eich., Schw.).
Europa (Fichtenwälder).

### 6. *Mesochorus svenssoni*, spec. nov.

**Beschreibung.** ♂: 6.0 mm; s. Sektions-Merkmale; Schläfe ≥ Augenbreite; Ocellen = Vertexbrücke; Stiel schmaler als bei den anderen Arten, > 4mal so lang wie breit; Griffel etwas nach oben gebogen; Gesicht

gelb, mit breiten weißen Facialorbiten; Frons schwarz; Thorax rot, Mesonotum überwiegend schwarzbraun; Metanotum schwarz, mit roten Pleuren; Beine rotgelb, mit weißen Tibien und 1/12 apikaler Verdunkelung; Abdomen schwarz; Tergite 2 und folgende schwarz/bräunlich vespoid.

**Typen.** Holotypus: ♂, Skåne/S, VII 69, Falle 1, Bo Svensson (AEI).

S-Schweden.

### Sektion 7. *vitticollis*

**Diagnose.** Ohne Merkmal-Kombinationen der Sektionen 1-6.

### Gruppe 7.1. *orbitalis*

**Diagnose.** Über den weißen Facial-Orbiten durchgehend breite weiße Frontal-Orbiten bis mindestens zu den Ocellen.

#### Besimmungstabelle der Arten (♀♀)

1(8) Abdomen ganz schwarz, nur Tergit-Endränder schmal hell

2(3) Ocellen > Vertexbrücke; Bohrer < Tarsus III, 1 ... 1. *salicis* Thomson (S. 64)

3(2) Ocellen = Vertexbrücke; Bohrer > Tarsus III, 1

4(5) Mesopleuren schwarz, fast glatt ... 2. *orbitalis* Holmgren (S. 64)

5(4) Mesopleuren überwiegend rot, ziemlich stark punktiert

6(7) Gesicht flächig schwarz; Beine rot ... 3. *temporalis* Thomson (S. 64)

7(6) Gesicht zweilappig schwarz; Beine weiß ... 4. *varius*, spec. nov. (S. 64)

8(1) Abdomen schwarz (braun) mit ausgedehnt roter Färbung

9(10) Unterer Mandibelzahn > oberer; Thorax gelbrot ... 5. *monacensis*, spec. nov. (S. 65)

10(9) Beide Mandibelzähne gleich; Thorax anders gefärbt

11(16) Coxa III verdunkelt

12(15) Stigma braun

13(14) Länge 4 mm; Petiolus extrem kurz ... 6. *brevipetiolatus* Ratzeburg (S. 65)

14(13) Länge 5.5 mm; Petiolus normal ... 7. *callis*, spec. nov. (S. 65)

15(12) Stigma hyalin; Länge 3.3 mm ... 8. *fuscicornis* Brischke (S. 66)

16(11) Coxa III hell

17(22) Stiel-Basis gelbrot

18(19) Stigma hyalin ... 9. *hyalinus*, spec. nov. (S. 66)

19(18) Stigma schwarzbraun

20(21) Mesopleuren rotgelb ... 10. *pallidus* Brischke (S. 66)

21(20) Mesopleuren schwarz ... 11. *dessauensis*, spec. nov. (S. 66)

22(17) Stiel-Basis dunkel

23(26) Stigma dunkelbraun bis schwarzbraun

24(25) Tibia-III-Ende ¼-⅕ geschwärzt ........................................ 12. *ibericus*, spec. nov. (S. 67)

25(24) Tibia-III-Ende 1/12 verdunkelt ........................................ 13. *albarascae*, spec. (S. 67)

26(23) Stigma (bräunlich-)hyalin

27(28) Mesopleuren gelbrot; Stigma hyalin ........................................ 14. *samarae*, spec. nov. (S. 67)

28(27) Mesopleuren (überwiegend) schwarz(-braun); Stigma hyalin-braun

29(30) Länge 4 mm; Ocellen viel < Vertexbrücke ........................................ 15. *juranus*, spec. nov. (S. 67)

30(29) Länge 5.5-6.5 mm; Ocellen = Vertexbrücke

31(32) Gesicht schwarz; die 2 weißen Frontalorbiten zusammen schmaler als die schwarze Gesichtsmitte ........................................ 16. *flaemingus*, spec. nov. (S. 67)

32(31) Gesicht braun; die 2 weißen Frontalorbiten zusammen so breit oder breiter als die schwarze Gesichtsmitte ........................................ 17. *zygaenae*, spec. nov. (S. 68)

**Bestimmungstabelle der Arten (♂♂)**

1(4) Griffel nadelspitz

2(3) Abdomen ab Tergit 3 vespoid gebändert ........................................ 2. *orbitalis* Holmgren (S. 64)

3(2) Abdomen ab Tergit 3 schwarz ........................................ 4. *varius*, spec. nov. (S. 64)

4(1) Griffel stumpf

5(6) Petiolus extrem kurz ........................................ 6. *brevipetiolatus* Ratzeburg (S. 65)

6(5) Petiolus normal

7(10) Coxa III verdunkelt

8(9) Griffel kompakt, = Tarsus III, 2 ........................................ 7. *callis*, spec. nov. (S. 65)

9(8) Griffel dünn, > Tarsus III, 2 ........................................ 8. *fuscicornis* Brischke (S. 66)

10(7) Coxa III hell

11(14) Stiel-Basis gelbrot

12(13) Griffel = Tarsus III, 2; Tergit 2 weiß ........................................ 10. *pallidus* Brischke (S. 66)

13(12) Griffel > Tarsus III, 2; Tergit 2 rot und schwarz ........................................ 12 *ibericus*, spec. nov. (S. 67)

14(11) Stiel-Basis dunkel

15(18) Griffel-Querschnitt rechteckig

16(17) Griffel dünn; Tarsi III hell ........................................ 1. *salicis* Thomson (S. 64)

17(16) Griffel klobig; Tarsi III dunkel ........................................ 3. *temporalis* Thomson (S. 64)

18(15) Griffel-Querschnitt kreisförmig

19(22) Stigma schwarzbraun; Mesopleuren stark punktiert

20(21) Mesoscutum in der Mitte in ganzer Länge gelb ........................................ 18. *exquisitus*, spec. nov. (S. 68)

21(20) Mesoscutum basal schwarz, apikal braun ........................................ 19. *scopulus*, spec. nov. (S. 68)

22(19) Stigma hyalin-braun; Mesopleuren nicht stark punktiert

23(24) Länge 5.3-6.4 mm; Postpetiolus schwarz ........................................ 17. *zygaenae*, spec. nov. (S. 68)

24(23) Länge 3.0-3.5 mm; Postpetiolus weitgehend rot ........................................ 20. *albolimbatus*, spec. nov. (S. 68)

### 1. *Mesochorus salicis* Thomson

*Mesochorus salicis* Thomson, 1885: 338, ♀ ♂.

**Diagnose.** ♀, ♂: 6-7 mm; Schläfe 0.6 (♀), 0.8 (♂) Augenbreite; Ocellen > Vertexbrücke; Mesopleurum dicht, fein punktiert; Bohrer ⅔ Tarsus III, 1; Griffel kompakt, = Tarsus III, 2; Gesicht etwas (♂) oder stärker (♀) gebräunt bis geschwärzt; Facial- und Frontalorbiten breit weiß; Thorax gelbrot, mit 2 braunen Mesoscutum-Streifen und braunem Metanotum; Stigma hyalin; Tibia-III-Ende 1/12 geschwärzt; Abdomen schwarz; Tergit-2-Ende sehr schmal gelb; Tergit-3-Mitte und breiter Endrand gelblich.

**Typen.** Lectotypus: ♀, Schwenke 1968 (UZI Lund).

Ex *Depressaria* (Gelechiidae) an *Centaurea* (Schw.)
Fundorte in Schweden und Deutschland.
N- und M-Europa.

### 2. *Mesochorus orbitalis* Holmgren

*Mesochorus orbitalis* Holmgren, 1858: 188, ♀.
*Mesochorus orbitalis*, Brischke 1880: 180, ♂.

**Diagnose.** ♀: 4.7-5.2 mm; Schläfe ca. 0.6 Augenbreite; Ocellen < Vertexbrücke; Mesopleuren glatt; Tergit 1 mit Mittelfurche; Bohrer relativ breit, > Tarsus III, 1; Gesicht schwarz; Facial-Orbiten schmal weiß, Frontal-Orbiten breit weiß; Thorax schwarz; Stigma hyalin; Coxa III verdunkelt; Tibia-III-Ende ⅙ schwarz; Abdomen schwarz; Tergit-2-Ende sehr schmal hell.

♂ wie ♀, aber: Griffel nadelspitz, etwas > Tarsus III, 2; Gesicht weißgelb; Prothorax, Meso- und Metapleuren rotgelb; Meso- und Metanotum schwarz; Mesoscutum und Scutellum mit braunen Wischen; Tergit 2 mit ⅙ rotem Endrand; ab Tergit 3 vespoid.

**Typen.** Coll. Holmgren (Stockholm).

Ex *Semasia* (Tortricidae) (Schw., Cap.).
Fundorte in Schweden, Polen, Deutschland, Ungarn.
N-, M- und SE-Europa.

### 3. *Mesochorus temporalis* Thomson

*Mesochorus temporalis* Thomson, 1885: 336, ♀ ♂.

**Diagnose.** ♀, ♂: 5-7.5 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren dicht flach punktiert; Bohrer > Tarsus III, 1; Griffel kompakt, im Querschnitt rechteckig, = Tarsus III, 2; Gesicht verdunkelt oder geschwärzt; Facial- und Frontal-Orbiten breit weiß; Thorax rot, nur Metathorax schwarz; Stigma (bräunlich-)hyalin; Abdomen schwarz, mit schmalen hellen Tergit-Endrändern; oder: Tergite 2 + 3 rötlich aufgehellt, folgende Tergite vespoid.

**Typen.** Syntypus: ♀, in coll. Bridgman (Norwich; lt. Fitton, 1982, 54).

Ex *Zygaena* (Zygaenidae) (Bign., lt. Dalla Torre, 1902).
Fundorte in Schweden, England, Deutschland, Österreich, N-Italien, Pyrenäen.
N-, Mi und W-Europa, südlich bis N-Italien und Pyrenäen.

### 4. *Mesochorus varius*, spec. nov.

**Beschreibung.** ♀, ♂: 4.8-5.3 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren schütter punktiert; Bohrer > Tarsus III, 1; Griffel im Querschnitt rechteckig, nedelspitz, etwas > Tarsus III, 2; Gesicht ♀ 2lappig geschwärzt, ♂ gelbweiß; Facial- und Frontal-Orbiten breit weiß; Pro- und Mesothorax rot, Metathorax schwarz; Stigma schmutzig hyalin; Beine weiß; Tibia-III-Ende ⅛-⅙ schwarz; Abdomen schwarz, mit schmalen hellen Segment-Endrändern.

**Typen.** Holotypus: ♀, Condove, Piem./I, 18.-28.7.79, Malaise-Falle, A. Scaramozzino (Scaramozzino). – Paratypus: 1♂, Mongrando, Piem./I, 400 m, G. Botta (Scaramozzino).

N-Italien.

### 5. *Mesochorus monacensis*, spec. nov.

**Beschreibung.** ♀: 7.0 mm; unterer Mandibelzahn > oberer; Schläfe > Augenbreite; Ocellus < Vertexbrücke; Mesopleuren schwach punktiert; Bohrer ca. ½ Tarsus III, 1; Clypeus gelb; Gesicht gelbweiß; Facial- und Frontal-Orbiten breit weiß; Körper gelbrot; Mesoscutum mit braunen Wischen; Stigma schwarzbraun; Tibia-III-Ende ¼ geschwärzt; Stiel-Mitte braun; Tergite 2 + 3 basal breit schwärzlich.

**Typen.** Holotypus: ♀ München/D, Leopold-Palais, 6.6.41 (leg. ?) (ZSM).

M-Europa.

### 6. *Mesochorus brevipetiolatus* Ratzeburg

*Mesochorus brevipetiolatus* Ratzeburg, 1844: 148, ♀.
*Mesochorus brevipetiolatus*, Ratzeburg 1852: 117, ♀ ♂.

**Diagnose.** ♀, ♂: 3.8-4.2 mm; Schläfe < Augenbreite; Ocellus = Vertexbrücke; Stigma etwas vergrößert; Petiolus extrem kurz; Postpetiolus mit großer Grube; Bohrer dünn, säbelförmig (Ende nach oben gebogen), etwas > Tarsus III, 1; Griffel < Tarsus III, 2; Gesicht stärker (♀) oder schwächer gebräunt (♂); Facial- und Frontal-Orbiten breit weiß; Thorax braun gelb- bis schwarzbraun, mit gelber Mesoscutum-Makel und (partiell) gelbem Scutellum; Stigma schwarzbraun, mit hyalinen oberen Ecken; Coxa III verdunkelt; Tibia-III-Ende ⅕ geschwärzt; Tergit schwarz(-braun), mit ⅓ gebogenem gelbem Endsaum; Tergit 3 rotgelb (♂), mit schmaler dunkler Binde im letzten Drittel (♀); folgende Tergite schwarz(-braun).

**Typen.** Verschollen.

Ex *Tmetocera* (Sphingidae) (Puhl.), *Smerinthus* (Sphingidae) (Noack), *Hibernia* (Geometridae) (Schm.).
Fundorte in Polen, Deutschland, Frankreich.
M-Europa.

### 7. *Mesochorus callis*, spec. nov.

**Beschreibung.** ♀: 5.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren fein dicht punktiert; Bohrer = Tarsus III, 1; Gesicht gebräunt oder schwarz gefleckt; Facial- und Frontal-Orbiten breit weiß; Stigma hyalin-braun; Coxa III verdunkelt; Thorax schwarz; Mesoscutum mit schulterumgreifendem gelbem Streifen und gelber H-Zeichnung; Scutellum seitlich gelb; Abdomen schwarz; Tergit 2 mit ⅓ rötlichem Endrand; ab Tergit 3 rot/braun vespoid.

♂: 4.8-5.2 mm; Griffel kompakt, = Tarsus III, 2; Färbung wie ♀, aber: Gesicht nur leicht gebräunt; Tergit-2-Ende schmaler gelbrot; Tergit 3 überwiegend oder ganz rot; ab Tergit 4 braun(-schwarz).

**Typen.** Holotypus: ♀, Fouesnant (Finistère)/F, 18.8.23, Nr. 927, A. Hémon (Paris). – Paratypen: 2♀♀, 2♂♂, Sent Surains, Val Gronda/CH, Gr., 1.500 m, E. Haeselbarth (ZSM); 1♂, Le Puy/F, H. Maneval (Paris); 1♂, Passiria/A, AD, 1.100 m, F. Hartig (ZSM).

Alpen.

### 8. *Mesochorus fuscicornis* Brischke

*Mesochorus fuscicornis* Brischke, 1880: 185, ♀ ♂.

**Diagnose.** ♀, ♂: 3.3-3.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren dicht fein punktiert; Bohrer > Tarsus III, 1; Gesicht geschwärzt (♀), hell (♂), Facial-Orbiten schmal, Frontal-Orbiten breit weiß; Thorax schwarz; ♀ Mesoscutum mit schulterumgreifendem gelbem Streifen und gelbem H-Fleck; Scutellum seitlich gelb; bei ♂ Mesonotum-Zeichnung nur schwach angedeutet; Abdomen schwarz; Tergit 2 mit ⅙-⅛ gelbem Endband; Tergit 3 fast ganz gelb; Griffel = Tarsus III, 2.

**Typen.** Verschollen.

Ex *Abraxas* (Geometridae) via *Apanteles* (Braconidae) (Bign.).
Fundorte in Polen, Deutschland, England, Frankreich, N-Italien.
M- und W-Europa.

### 9. *Mesochorus hyalinus*, spec. nov.

**Beschreibung.** ♀: 5.8 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren schütter punktiert; Stigma verlängert; Bohrer = Tarsus III, 1; Gesicht rotgelb, mit glasig-weißen breiten durchgehenden Orbiten; Thorax rotgelb, mit dunklen Mesoscutum-Wischen; Stigma hyalin; Abdomen schwarz; Tergit 1 basal breit rot; Tergit 2 mit apikalem Bogenfleck bis Mitte; ab Tergit 3 gelbrot.

**Typen.** Holotypus: ♀, Jena, Thür./D, 10 km NE, 19.6.88, Nr. 96/88, H. Zoerner (DEI).

M-Deutschland.

### 10. *Mesochorus pallidus* Brischke

*Mesochorus pallidus* Brischke, 1880: 184, ♀♂.
*Mesochorus stigmaticus* Thomson, 1885: 341, ♀♂; syn. Schmiedeknecht 1910: 1987.
*Mesochorus orgyiae* Dalla Torre, 1901: 56, ♀♂; syn. Schmiedeknecht 1910: 1987.

**Diagnose.** ♀, ♂: 4.5-6.3 mm; Schläfe < Augenbreite; Ocellus > (♀), = (♂) Vertexbrücke; Stigma verbreitert; Bohrer = Tarsus III, 1; Griffel dünn, = Tarsus III, 2; Gesicht gelbrot; Facial- und Frontal-Orbiten breit weiß; Thorax gelbrot; Mesoscutum mit weißer H-Zeichnung und braunen Wischen; Scutellum braun, mit gelber Mitte; Stigma schwarzbraun, mit helleren oberen Ecken; Tibia-III-Ende ⅛-⅒ geschwärzt; Tergit 1 schwarz, mit breiter roter Basis; Tergit 2 braun, mit ⅓-⅔ rotem bogenförmigen Endband; Tergit 3 ganz rot(-gelb); ab Tergit 4 gelb/rot vespoid.

**Typen.** Verschollen. – *M. stigmaticus* Thomson: Lectotypus: ♀, Schwenke 1968 (UZI Lund.).

Ex *Erannis* (Geometridae) via *Apanteles* (Braconidae) (Schw.); ex *Cucullia* (Noctuidae), *Amphidasis* (Geometridae), *Smerinthus* (Sphingidae) via *Microgaster* (Braconidae) (Bri.); ex *Porthesia* (Lymantriidae) via *Rogas* (Braconidae) (Bri.).
Fundorte in Schweden und Deutschland.
N- und M-Europa.

### 11. *Mesochorus dessauensis*, spec. nov.

**Beschreibung.** ♀: 3.5-4.3 mm; wie *M. pallidus*, aber: kleiner; Frontal-Orbiten viel schmaler weiß; Thorax schwarz, mit heller Mesoscutum-Zeichnung; Bohrer schmaler und länger, > Tarsus III, 1; Tergit 3 nur basale Hälfte rot; Abdomen danach braun(-schwarz)/rot vespoid.

**Typen.** Holotypus: ♀, Dessau/D, 4 km SW, 19.9.85, Nr. 266/85, Taube-Ufer, H. Zoerner (DEI). – Paratypus: 1♀, Dessau/D, H. Zoerner (DEI); (ohne Kopf; Abdomen gesondert geklebt).

M-Deutschland.

### 12. *Mesochorus ibericus*, spec. nov.

**Beschreibung.** ♀, ♂: 4.5-5.0 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren beim ♀ stärker, beim ♂ schwächer punktiert; Stigma verbreitert; Bohrer relativ breit, < Tarsus III, 1; Griffel lang und dünn, fast Tarsus III, 2 + 3; Gesicht gebräunt (♀), braun gefleckt (♂); Facial- und Frontal-Orbiten breit weiß; Thorax rot; Mesoscutum mit braunen Wischen; ♀ Metanotum basal braun; Stigma dunkel-(schwarz-)braun); Tibia-III-Ende ⅕-¼ geschwärzt; Tergit 1 schwarz (♀), braun (♂), mit ½ rotem Endrand (♂); Tergit 3 und folgende rot/braun vespoid (♀); Tergite 3 + 4 rot, folgende braun (♂).

**Typen.** Holotypus: ♀, Moreira/E, Alicante, 90 m, 14.-20.10.89, Malaise-Falle R. Wahis (Wahis). – Paratypen: 1♀, 1♂, El Soldado/E, Sierra Morena, A. Seyrig (Paris).

Iberische Halbinsel.

### 13. *Mesochorus albarascae*, spec. nov.

**Beschreibung.** ♀: 4.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Stigma etwas verbreitert; Bohrer < Tarsus III, 1; Gesicht gebräunt; Facial-Orbiten schmal weiß, Frontal-Orbiten breit weiß; Thorax rot; Mesoscutum mit schwacher heller H-Zeichnung; oberes Metanotum bräunlich; Stigma schwarzbraun; Tergit 1 schwarz; Tergit 2 schwarz, apikal ⅓ rot; ab Tergit 3 rot.

**Typen.** Holotypus: ♀, Piemonte (AL)/I, Albarasca 519 m, Berio leg. (Scaramozzino). – Paratypus: 1♀, dto.

Nord-Italien.

### 14. *Mesochorus samarae*, spec. nov.

**Beschreibung.** ♀: 5.0 mm; Schläfe < Augenbreite; Ocellus = Vertexbrücke; Bohrer = Tarsus III, 1; Gesicht stark gebräunt; Facial-Orbiten schmal weiß, Frontal-Orbiten breit weiß; Thorax rot; Mesoscutum mit gelber H-Zeichnung; Metanotum basal braun; Stigma hyalin; Tibia-III-Ende ⅐ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, apikal ¼-⅓ rot; ab Tergit 3 rot.

**Typen.** Holotypus: ♀, Samara/USSR, 1.9.29, leg. Lubischew; coll. A. Seyrig (Paris). – Paratypus: 1♀, dto.

Rußland.

### 15. *Mesochorus juranus*, spec. nov.

**Beschreibung.** ♀: 4.1 mm; Schläfe < Augenbreite; Ocellen klein; Bohrer relativ breit, = Tarsus III, 1; Gesicht schwarz; Facial-Orbiten schmaler, Frontal-Orbiten breiter weiß; Prothorax gelbrot; Mesothorax schwarz; Mesoscutum mit weißlicher H-Zeichnung; Scutellum rot; Mesopleuren oben etwas rot, sonst schwarz; Abdomen schwarz; Tergit 2 mit ⅛ gelbem Endrand; Tergit 3 in der Mitte durchgehend gelb; ab Tergit 4 braun.

**Typen.** Holotypus: ♀, Eichstätt, Bay./D, 7.80, W. Schwenke (ZSM).

S-Deutschland.

### 16. *Mesochorus flaemingus*, spec. nov.

**Beschreibung.** ♀: 5.0 mm; Schläfe < Augenbreite; Ocellus = Vertexbrücke; Bohrer < Tarsus II, 1 + 2 (Tarsi III fehlend); Gesicht schwarz; Facial- und Frontal-Orbiten breit weiß; Thorax schwarz; Mesoscutum mit brauner H-Zeichnung; Scutellum seitlich braun; Stigma bräunlich-hyalin; Tibia-III-Ende ⅕ schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅛ rotem Endrand; ab Tergit 3 rot, mit Verdunklungen.

**Typen.** Holotypus: ♀, Wiesenburg, Fläming/D, 6.85, W. Schwenke (ZSM).

Östl. Deutschland.

### 17. *Mesochorus zygaenae*, spec. nov.

**Beschreibung.** ♀: 5.3-6.4 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren schütter punktiert; Postpetiolus mit Längsgrube; Bohrer < Tarsus III, 1; Gesicht gebräunt; Facial-Orbiten mäßig breit, Frontal-Orbiten übermäßig breit weiß; Thorax schwarz; Prothorax seitlich rotgelb; Mesoscutum mit gelber H-Zeichnung; Scutellum seitlich gelblich; Mesopleuren schwarz und rot und gelblich; Metanotum unten rötlich; Tibia-III-Ende ⅛-⅒ gebräunt; Tergite 1 + 2 schwarz, letzteres apikal ⅕-¼ gelbrot; ab Tergit 3 rot.

**Typen.** Holotypus: ♀, Umgeb. Bremen/D, 14.7.04, Pfankuch (Krefeld). – Paratypus: ♀ Celle/D (leg. ?) "ex *Zygaena filipendula*". Bohrer beschädigt (ZSM).

M-Europa.

### 18. *Mesochorus exquisitus*, spec. nov.

**Beschreibung.** ♂: 4.7 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Stigma verbreitert; Postpetiolus mit 3 Längsgruben; Griffel lang, = ½ Tibia II, am Ende etwas verbreitert (Tibiae und Tarsi III fehlend); Gesicht gelb; Facial- und Frontal-Orbiten breit weiß; Thorax schwarz; Prothorax rot; Mesoscutum gelbrot, mit 2 breiten schwarzen Seitenbändern; Scutellum und Postscutellum rot; Metanotum basal ⅔ schwarz, apikal rot; Meso- und Metapleuren rot; Stigma schwarzbraun, mit helleren oberen Ecken; Tergit 1 schwarz; Tergit 2 schwarz, mit ½ apikaler gelber Binde; Tergit 3 fast ganz rot; ab Tergit 4 braun/gelbrot vespoid.

**Typen.** Holotypus: ♂, Alpes mar./F, Peira cava 1.500-2.000 m, 1931, A. Seyrig (Paris).

Französ. Alpen.

### 19. *Mesochorus scopulus*, spec. nov.

**Beschreibung.** ♂: 7.0 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Radialzelle lang und spitz; Griffel lang und dünn, fast Tarsus III, 2 + 3; Gesicht gelb, unter den Fühlern braun gefleckt; Facial- und Frontal-Orbiten breit weiß; Thorax schwarz; Mesoscutum mit brauner H-Zeichnung; Scutellum seitlich braun; Stigma dunkelbraun; Tibia-III-Ende ⅕ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅕ weißgelbem Endband; Tergit 3 gelbrot, seitlich verdunkelt; ab Tergit 4 braun/gelbrot vespoid.

**Typen.** Holotypus: ♂, Ramosch, 1.650 m, Graubünden/CH, 4.8.73, E. Haeselbarth (ZSM).

Schweizer Alpen.

### 20. *Mesochorus albolimbatus*, spec. nov.

**Beschreibung.** ♂: 3.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Griffel = Tarsus III, 2; Gesicht gelb; Facial- und Frontal-Orbiten breit weiß; Stigma hellbraun; Thorax rotgelb; Mesoscutum mit je einem braunen breiten Randstreifen; Tergit 1 basal dunkelbraun, apikal rot; Tergit 2 und 3 rot, seitlich verdunkelt; ab Tergit 4 rot, schwach vespoid.

**Typen.** Holotypus: ♂, Alpes mar./F, Peira cava, 1.500-2.000 m, 1931, A. Seyrig (Abdomen angeklebt) (Paris). – Paratypen: 2♂♂, dto., ohne Abdomen.

Französ. Alpen.

### Gruppe 7.2. *fulvus*

**Diagnose.** Abdomen ganz rot: H (höchstens mit schwachen Bräunungen).

## Bestimmungstabelle der Arten (♀♀)

| | | |
|---|---|---|
| 1(2) | Stigma dunkelbraun | 1. *lapponicus* Thomson (S. 69) |
| 2(1) | Stigma hyalin, gelblich oder hyalin-braun | |
| 3(4) | Unterer Mandibelzahn > oberer | 2. *fulgurans* Curtis (S. 70) |
| 4(3) | Beide Mandibelzähne gleich | |
| 5(10) | Klauen ungezähnt | |
| 6(7) | Tergit 3 verdunkelt; Klauenglieder etwas ballonförmig | 3. *agnellonis*, spec. nov. (S. 70) |
| 7(6) | Tergit 3 unverdunkelt; Klauenglieder normal | |
| 8(9) | Bohrer dick, rot; Gesicht quer | 4. *fulvus* Thomson (S. 70) |
| 9(8) | Bohrer schlank, schwarz; Gesicht quadratisch | 5. *macrophyae*, spec. nov. (S. 70) |
| 10(5) | Klauen gezähnt | |
| 11(12) | Klauen lang gezähnt; Bohrer gerade | 6. *suecicus* D.T. (S. 71) |
| 12(11) | Klauen kurz gezähnt; Bohrer-Ende nach oben gebogen | 7. *britannicus*, spec. nov. (S. 71) |

## Bestimmungstabelle der Arten (♂♂)

| | | |
|---|---|---|
| 1(2) | Stigma schwarzbraun | 1. *lapponicus* Thomson (S. 69) |
| 2(1) | Stigma hyalin bis hyalin-braun | |
| 3(6) | Klauen verlängert und sichelförmig gekrümmt | |
| 4(5) | Ocellus = Vertexbrücke; Mandibeln rot | 8. *falcatus*, spec. nov. (S. 71) |
| 5(4) | Ocellus > Vertexbrücke; Mandibeln weiß | 9. *hamatus*, spec. nov. (S. 71) |
| 6(3) | Klauen normal | |
| 7(8) | Schläfe = Augenbreite | 2. *fulgurans* Curtis (S. 70) |
| 8(7) | Schläfe < Augenbreite | |
| 9(10) | Schläfe > ½ Augenbreite; Gesicht quer | 4. *fulvus* Thomson (S. 70) |
| 10(9) | Schläfe = ½ Augenbreite; Gesicht quadratisch | |
| 11(12) | Tergit 3 gelbrot; Griffel parallel | 6. *suecicus* D.T. (S. 71) |
| 12(11) | Tergit 3 verdunkelt; Griffel gebogen und gekreuzt | 3. *agnellonis*, spec. nov. (S. 70) |

## 1. *Mesochorus lapponicus* Thomson

*Mesochorus lapponicus* Thomson, 1885: 336, ♀ ♂.

**Diagnose.** ♀, ♂: 7-8 mm; Schläfe < Augenbreite; Ocellus etwas > Vertexbrücke; Bohrer < Tarsus III, 1; Griffel dünn, zur Spitze verjüngt, etwas > Tarsus III, 2; Körper gelbrot; Stigma in auffälligem Gegensatz dazu schwarzbraun.

**Typen.** Lectotypus: ♀, Schwenke 1968 (UZI Lund).

Mehrere Fundorte in Lappland.
N-Europa.

### 2. *Mesochorus fulgurans* Curtis

*Mesochorus fulgurans* Curtis, 1833: 464, ♀.
*Mesochorus laricis* Hartig, 1838: 273, ♀ (syn. Schmiedeknecht 1910, 1976).
*Mesochorus laricis* Ratzeburg, 1844: 149, ♀♂ (syn. Schmiedeknecht, s.o.).

**Diagnose.** ♀, ♂: 5-7 mm; Schläfe = Augenbreite; Ocellus viel < Vertexbrücke; unterer Mandibelzahn > oberer; Gesicht ♀ quer, ♂ quadratisch; Bohrer ca. ⅔ von Tarsus III, 1; Griffel > Tarsus III, 2; Körper gelbrot; Stigma gelblich-hyalin.

**Typen.** Verschollen.

Häufiger Sekundärparasit bei Diprionidae.
Fundorte in Schweden, Polen, Deutschland, England, Tschechien, Österreich; offenbar stets in Kiefernwäldern.
N-, M- und W-Europa.

### 3. *Mesochorus agnellonis*, spec. nov.

**Beschreibung.** ♀, ♂: 4.8-5.0 mm; Schläfe < ½ Augenbreite; Gesicht quadratisch; Ocellus > Vertexbrücke; Radialzelle auffällig lang; Klauen-Glieder etwas ballonförmig; Bohrer = ¾ Tarsus III, 1; Griffel = Tarsus III, 2, nach innen gekrümmt, gekreuzt; Stigma fast hyalin; Körper rot, mit Verdunklungen in Abdomen-Mitte.

**Typen.** Holotypus: ♀, Pontecchianale, CN, Piem./I, Colle Agnello 2.050 m, 2.8.86 A. Scaramozzino (Scaramozzino). – Paratypus: 1♂, dto.

Ital. Alpen.

### 4. *Mesochorus fulvus* Thomson

*Mesochorus fulvus* Thomson, 1885: 336, ♀♂.

**Diagnose.** ♀, ♂: 6.7-8.1 mm; Schläfe < Augenbreite; Ocellus > Vertexbrücke; Gesicht quer; Mesopleuren dicht flach punktiert; Bohrer = ⅔ Tarsus III, 1; Griffel dünner werdend, ≥ Tarsus III, 2; Körper gelbrot; Stigma bräunlich-hyalin.

**Typen.** Lectotypus: ♀, Townes, Momoi & Townes 1965 (UZI Lund).

Häufiger Sekundär-Parasit bei Diprionidae (Tenthredinidae.).
Fundorte in allen Teilen Europas.
Europa.

### 5. *Mesochorus macrophyae*, spec. nov.

**Beschreibung.** ♀: 6.1 mm; Schläfe < Augenbreite; Ocellus > Vertexbrücke; Gesicht quadratisch; Mesopleuren dicht flach punktiert; Bohrer schlank, = Tarsus III, 1; Körper gelbrot; Tibia-III-Ende $1/12$ verdunkelt; Tergit-1-Ende und Tergit-2-Anfang etwas verdunkelt.

**Typen.** Holotypus: ♀, Ahlfeld, Hannover/D, 30.8.61, ex *Macrophya punctum album* (Tenthr.), K. Hinz (ZSM).

Deutschland.

### 6. *Mesochorus suecicus* Dalla Torre

*Mesochorus suecicus* Dalla Torre, 1901: 58, ♀♂.
*Mesochorus pectinipes* Thomson, 1885: 336, ♀♂ (non Bridgman, 1883). Da der Name durch Bridgman okkupiert wurde, benannte Dalla Torre die Art neu.

**Diagnose.** ♀, ♂: 6-7.5 mm; Schläfe = ½ Augenbreite; Gesicht quadratisch; Ocellus > Vertexbrücke; Klauen ♀ lang gezähnt; Bohrer < Tarsus III, 1; Griffel = Tarsus III, 2; Körper gelbrot; Stigma schmutzighyalin.

**Typen.** Verschollen. – *M. pectinipes* Thomson: Lectotypus; ♀, Townes, Momoi & Townes 1965 (UZI Lund).

Ex Lepidoptera: *Abraxas* (Geometridae) (Schmied.), *Lygris* (Geometridae) (Haes.), *Cymatophora* (Cymatophoridae) via *Rogas* (Braconidae) (Schw.).
Fundorte in Schweden, Deutschland, N-Italien.
N- und M-Europa.

### 7. *Mesochorus britannicus*, spec. nov.

**Beschreibung.** ♀: 6.1 mm; Schläfe < Augenbreite; Gesicht quer; Ocellus = Vertexbrücke; Klauen kurz gezähnt; Mesopleuren fein punktiert; Bohrer am Ende aufgebogen, viel < Tarsus III, 1; Körper rot; Stigma bräunlich-hyalin, Unterseite weiß schillernd; Gesicht 2farbig: weiß = Mandibeln, untere Wangen und untere Facial-Orbiten, sonst rot.

**Typen.** Holotypus: ♀, Oxford/UK, 7.81, C 12, Denis Owen (AEI).

England.

### 8. *Mesochorus falcatus*, spec. nov.

**Beschreibung.** ♂: 7.5 mm; Schläfe = Augenbreite; Gesicht quer; Ocellus = Vertexbrücke; Stigma verlängert und verbreitert; Mesopleuren stark punktiert; Klauen auffällig schmal, lang, sichelförmig gebogen; Griffel = Tarsus III, 2 mit langen Basalkörpern, fast spitz endend; Körper rot; Stigma hyalin.

**Typen.** Holotypus: ♂, Dessau/D, 4 km SSW, 7.8.86, Nr. 100/86, Taube-Ufer, H. Zoerner (DEI).

M-Europa.

### 9. *Mesochorus hamatus*, spec. nov.

**Beschreibung.** ♂: 6.5 mm; Schläfe = Augenbreite; Gesicht quer; Ocellus > Vertexbrücke; Mesoscutum mit großer flacher Grube; Klauen sichelförmig wie *M. falcatus*; Mandibeln weiß; Griffel = Tarsus III, 2.

**Typen.** Holotypus: ♂, Riva rocchetta, E-Italien, 400-600 m, 20.5.82, E. Haeselbarth (ZSM).

N-Italien.

### Gruppe 7.3. *angustatus*

**Diagnose.** Ganzes Abdomen dunkel (schwarz): D (höchstens mit schmalen helleren Tergit-Endrändern; zuweilen Abdomen-Mitte mit rötlichem Schimmer).

## Bestimmungstabelle der Arten (♀♀)

1(32) Coxa III hell

2(13) Ocellus > Vertexbrücke

3(6) Stigma hyalin

4(5) Mesopleurum rot, glatt ... 1. *oppacheus*, spec. nov. (S. 73)

5(4) Mesopleurum schwarz, stark punktiert ... 2. *argus*, spec. nov. (S. 74)

6(3) Stigma braun

7(10) Thorax (überwiegend) schwarz; Länge 4.5-7.5 mm

8(9) Schwarzes Gesicht ohne helle Facial-Orbiten ... 3. *opacus*, spec. nov. (S. 74)

9(8) Schwarzes Gesicht mit hellen Facial-Orbiten ... 4. *rubeculus* Hartig (S. 74)

10(7) Thorax (partiell) rot; Länge 8.8-9.3 mm

11(12) Thorax rot; Tibia-III-Ende ⅛-⅒ verdunkelt ... 5. *bavaricus*, spec. nov. (S. 74)

12(11) Thorax rot und schwarz; Tibia-III-Ende ⅙ geschwärzt ... 6. *procerus*, spec. nov. (S. 75)

13(2) Ocellus ≤ Vertexbrücke

14(23) Bohrer > Tarsus III, 1

15(18) Stigma hyalin

16(17) Tibia-III-Ende ⅛ geschwärzt ... 7. *giberius* Thunberg (S. 75)

17(16) Tibia-III-Ende ⅕ geschwärzt ... 8. *discolor*, spec. nov. (S. 75)

18(15) Stigma braun

19(20) Länge 6.8 mm; Nervulus postfurkal ... 9. *piceanus*, spec. nov. (S. 75)

20(19) Länge 4-5 mm; Nervulus interstitial

21(22) Postpetiolus mit langer breiter Furche ... 10. *canalis*, spec. nov. (S. 76)

22(21) Postpetiolus ohne lange Furche [Indiv. mit hellen Coxae III ... 16. *tetricus* Holmgren] (S. 76)

23(14) Bohrer ≤ Tarsus III, 1

24(25) [Stigma (gelb-)hyalin (Indiv. mit kürzerem Bohrer) ... 7. *giberius* Thunberg] (S. 75)

25(24) Stigma braun

26(29) Tibia-III-Ende ¼ undeutlich ... 11. *fraterculus*, spec. nov. (S. 76)

27(28) Tibia-III-Ende max. ⅙ geschwärzt

28(27) Tibia-III-Ende hell; Gesicht verdunkelt ... 12. *fulvipes*, spec. nov. (S. 76)

29(26) Tibia-III-Ende ⅕-⅙ geschwärzt; Gesicht schwarz

30(31) Stigma schwarzbraun ... 13. *sublimis*, spec. nov. (S. 76)

31(30) Stigma hellbraun ... 14. *pyrenaeus*, spec. nov. (S. 77)

32(1) Coxae III verdunkelt

33(36) Bohrer viel > Tarsus III, 1

34(35) Bohrer nach unten gebogen (Abb. 1C) ... 15. *curvicaudus* Thomson (S. 77)

35(34) Bohrer gerade ... 16. *tetricus* Holmgren (S. 77)

36(33) Bohrer ≤ Tarsus III, 1

37(42) Tibia-III-Ende ¼-⅕ schwarz

38(39) Tibia-III-Ende ¼ geschwärzt; Bohrer = Tarsus III, 1 ............... 17. *perugianus*, spec. nov. (S. 77)

39(38) Tibia-III-Ende ⅕ geschwärzt; Bohrer < Tarsus III, 1

40(41) Mesoscutum rot; Bohrer-Ende relativ breit ............... 18. *mirabilis*, spec. nov. (S. 78)

41(40) Mesoscutum dunkelbraun und rot; Bohrer-Ende fast spitz ............... 19. *plebejanus*, spec. nov. (S. 78)

42(37) Tibia-III-Ende hell oder undeutlich verdunkelt

43(44) Ocellus = Vertexbrücke ............... 20. *angustatus* Thomson (S. 78)

44(43) Ocellus < Vertexbrücke

45(46) Länge 6 mm ............... 21. *caliginosus*, spec. nov. (S. 78)

46(45) Länge 3.5 mm ............... 22. *parvioculatus*, spec. nov. (S. 79)

**Bestimmungstabelle der Arten (♂♂) mit durchgehend schwarzem Abdomen**

(♂♂ mit partiell rotem Abdomen s. S. 115)

1(8) Mesopleuren schwarz

2(5) Ocellus < Vertexbrücke

3(4) Stigma hyalin ............... 7. *giberius* Thunberg (S. 75)

4(3) Stigma dunkelbraun ............... 11. *fraterculus*, spec. nov. (S. 76)

5(2) Ocellus > Vertexbrücke

6(7) Griffel dünn stabförmig ............... 4. *rubeculus* Hartig (S. 74)

7(6) Griffel kompakt ............... 3. *opacus*, spec. nov. (S. 74)

8(1) Mesopleuren (partiell) rot

9(10) Mesopleuren rot; Schläfe = Augenbreite ............... 12. *fulvipes*, spec. nov. (S. 76)

10(9) Mesopleuren rot und schwarz(-braun); Schläfe < Augenbreite

11(12) Gesicht gelbweiß; Griffel stumpf ............... 23. *albifacies*, spec. nov. (S. 79)

12(11) Gesicht rot und schwarz; Griffel spitz ............... 24. *trentinus*, spec. nov. (S. 79)

### 1. *Mesochorus oppacheus*, spec. nov.

**Beschreibung.** ♀: 5.1 mm; Schläfe viel < Augenbreite; Ocellus > Vertexbrücke; Gesicht quadratisch; Bohrer < Tarsus III, 1; Gesicht schwarz, mit schmalen gelblichen Facial-Orbiten; Prothorax rot und schwarz; übriger Thorax rot, mit undeutlicher brauner Mesoscutum-Zeichnung; Stigma schmutzig-hyalin; Tibia-III-Ende ¼ verdunkelt; Abdomen schwarz; Tergite 2 und 3 mit rotem Schimmer.

**Typen.** Holotypus: ♀, Oppach, Thür./D, 15.8.93, Nr. 304/93, H. Zoerner (DEI).

M-Deutschland.

### 2. *Mesochorus argus*, spec. nov.

**Beschreibung.** ♀: 5 mm; Schläfe viel < Augenbreite; Ocellus > Vertexbrücke; Tergit 1 apikal und Tergit 2 basal mit Längseindruck; Bohrer < Tarsus III, 1, am Ende aufgebogen; Gesicht schwarz, mit rötlichen Facial-Orbiten; zwischen Augenrand und Fühlern gelber Fleck; Thorax-Seiten rot; Mesoscutum hellbraun, mit schwacher gelblicher H-Zeichnung; Mesonotum schwarz; Stigma hyalin; Tibia-III-Ende ca. ⅒ geschwärzt; Abdomen schwarz, mit sehr schmalem hellem Tergit-2-Endrand.

**Typen.** Holotypus: ♀, Piemonte (AL)/I, Albarasca, 519 m (Datum ?), Berio leg. (Scaramozzino). – Paratypen: 2♀♀, Ardeche/F, St. Thome, R. Wahis (AEI).

N-Italien, Frankreich.

### 3. *Mesochorus opacus*, spec. nov.

**Beschreibung.** ♀, ♂: 4.5-5.0 mm; Schläfe viel < Augenbreite; Ocellus > Vertexbrücke; Bohrer < Tarsus III, 1; Griffel < Tarsus III, 2; Gesicht ♀ ganz schwarz ohne hellere Facial-Orbiten, ♂ nur in der Mitte schwarzbraun; Thorax schwarz, ♂ Prothorax überwiegend rot; Stigma braun; Coxae rot; Tibia-III-Ende ⅕ geschwärzt; Abdomen schwarz, mit schmalem hellem Tergit-2-Endrand, beim ♂ Tergit 2 apikal und Tergit 3 basal mit Rotschimmer.

**Typen.** Holotypus: ♀, Oppach, Thür./D, 1,3 km 0, 3.8.93, Nr. 275/93, H. Zoerner (DEI). – Paratypen: 1♀, 2♂♂, dto.; 1♀, Niedis/PL, Al., Bioc. (leg. ?) (Warschau); 1♂, Nürnberg/D, Schwenke (ZSM).

Via Braconidae-Kokon an jg. Kiefer (Schw.)
M-Europa.

### 4. *Mesochorus rubeculus* Hartig

*Mesochorus rubeculus* Hartig, 1838: 273, ♀.
*Mesochorus ocellatus* Brischke, 1880: 187, ♂; **syn. nov.** nach Beschreibung.

**Diagnose.** ♀, ♂: 4.8-7.5 mm; Schläfe viel < Augenbreite; Ocellus > Vertexbrücke; Bohrer ½-⅔ Tarsus III, 1; Griffel dünn < Tarsus III, 2; Gesicht schwarz, mit helleren Facial-Orbiten (♀) oder gebräunt (♂); Thorax schwarz; Mesoscutum mit brauner H-Zeichnung; Stigma (schwarz-)braun; Tibia-III-Ende ¼ (oft undeutlich) geschwärzt; Abdomen schwarz, mit schmalem hellem Tergit-2-Endrand; ♂: Tergit 2 apikal und Tergit 3 basal mit Rotschimmer.

**Typen.** Holotypus: ♀, "*rubeculus* HTG.", coll. Hartig (ZSM).

Ex *Bupalus* (Geometridae) via *Campoplex* (Ichneumonidae); ex *Semiothisa* (Geometridae) via *Apanteles* (Braconidae); ex *Panolis* (Noctuidae) via *Meteorus* (Braconidae) (Schw.).
Aus allen Teilen Europas bekannt.
Europa.

### 5. *Mesochorus bavaricus*, spec. nov.

**Beschreibung.** ♀: 8.8-9.5 mm; Schläfe viel < Augenbreite; Ocellus > Vertexbrücke; Bohrer ca. ¾ Tarsus III, 1; Gesicht schwarz, mit schmalen hellen Facial-Orbiten; Thorax rot, mit gelblicher Mesoscutum H-Zeichnung; Stigma rotbraun; Tibia-III-Ende ⅛-⅒ geschwärzt; Abdomen schwarz, mit sehr schmalem hellem Tergit-2-Endrand.

**Typen.** Holotypus: ♀, Ellmau, Obb./D, 600 u. 700 m; E. Bauer (ZSM). – Paratypen: 2♀♀, Garmisch, Obb./D, 600 und 700 m; E. Bauer (ZSM).

Bayer. Alpen.

### 6. *Mesochorus procerus*, spec. nov.

**Beschreibung.** ♀: 9 mm; Schläfe < Augenbreite; Ocellus > Vertexbrücke; Mesopleuren dicht flach punktiert; Tergit 1 apikal mit Furche, die sich, verflacht, bis zu Tergit 3 fortsetzt; Bohrer < Tarsus III, 1; Gesicht schwarz, ohne helle Orbiten; Stigma dunkelbraun; Thorax rot, nur Metanotum basal dunkelbraun; Tibia-III-Ende ⅙ geschwärzt; Abdomen schwarz, mit sehr schmalen hellen Segmentgrenzen.

**Typen.** Holotypus: ♀, Italien, IM, Renaldo, Colla Sanson, 26.7.86, A. Scaramozzino (Scaramozzino).

N-Italien.

### 7. *Mesochorus giberius* Thunberg

*Mesochorus giberius* Thunberg, 1822: 263, ♀♂.
*Mesochorus thoracicus* Gravenhorst, 1829: 971, ♀♂; syn. Roman 1912.
*Mesochorus marginatus* Thomson, 1885: 339, ♀♂; **syn. nov.** nach Lectotypus.

**Diagnose.** ♀, ♂: 5-7.5 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Gesicht quer, mit divergierenden Augenrändern; Mesopleuren stark punktiert; Klauen gekämmt; Postpetiolus gerieft, wobei eine *Astiphromma*-ähnliche Steitenleiste vorgetäuscht werden kann; Bohrer = Tarsus III, 1; Griffel etwas > Tarsus III, 2, klobig, am Ende etwas aufgebogen; Gesicht verdunkelt bis schwarz, mit breiten gelbweißen Facial-Orbiten und weißem Dreiecksfleck neben den Fühlern; Thorax farblich variierend von überwiegend schwarz bis überwiegend rot; Stigma gelb-hyalin; Tibia-III-Ende schmal undeutlich verdunkelt; Abdomen schwarz, mit schmalen weißlichen Tergit-Endrändern, bei ♀♀ selten, bei ♂♂ überwiegend Tergite 2 + 3 mehr oder weniger rot gefärbt.

**Typen.** Verschollen. – *M. marginatus* Thomson: Lectotypus: ♀, Aubert 1966 (UZI Lund).

Ex *Zygaena* (Zygaenidae) (Gir. lt. Schmiedeknecht 1910). Angaben über diverse adulte Coleoptera als Primär-Parasiten (s. Schmiedeknecht 1910) sind nicht glaubhaft.
Fundorte in allen Teilen Europas.
Europa.

### 8. *Mesochorus discolor*, spec. nov.

**Beschreibung.** ♀: 4 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Stigma etwas verbreitert; Nervulus postfurkal; Postpetiolus mit Furche; Bohrer > Tarsus III, 1; Gesicht schwarz, mit breiten roten Facial-Orbiten; Frontal-Orbiten neben Fühlern dreieckig weiß; Thorax schwarz; Mesopleuren, Mesoscutum-Zeichnung und Scutellum-Seiten rot; Stigma hyalin, untere Ecke dunkelbraun; Tibia III weiß, am Ende ⅙ schwarz.

**Typen.** Holotypus: ♀, Leicester/UK, 7.74, Jennifer Owen (AEI).

England.

### 9. *Mesochorus piceanus*, spec. nov.

**Beschreibung.** ♀: 6.8 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Nervulus postfurkal; Postpetiolus mit Mittelfurche, diese, abgeflacht, bis Tergit 3; Bohrer am Ende breit, > Tarsus III, 1 (Tarsus III + ½ Tarsus III, 2); Gesicht schwarz, mit rötlichen Facial-Orbiten; Stigma tiefbraun; Thorax schwarz; Mesoscutum flächig gelb; Scutellum seitlich rot; Tibia III weiß, mit ⅓ schwarzem Ende; Abdomen schwarz; Tergit-2-Ende schmal hell, apikal ca. ⅕ mit rotem Schimmer.

**Typen.** Holotypus: ♀, Zborov/ČSFR, 4.3.65, Capec (Capek).

Ex *Cacoecia piceana* (Tortricidae) (Cap.).
Östl. M-Europa.

### 10. *Mesochorus canalis*, spec. nov.

**Beschreibung.** ♀: 4.0 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren relativ stark punktiert; Stigma verlängert; im linken Vorderflügel (rechts fehlend) Außenrand der 3. Discoidal-Zelle winklig eingezogen (wahrscheinlich individuelle Aberration); Petiolus kurz; Postpetiolus breit, kastenförmig, mit sehr großer wulstiger Längsfurche; Bohrer = Tarsus III, 1; Gesicht schwarz, mit schmalen roten Orbiten; Thorax schwarz; Tibia-III-Ende ⅓ unscharf verdunkelt; Abdomen schwarz; Tergit-2-Endrand schmal rötlich.

**Typen.** Holotypus: ♀, Oppach, Thür./D, 1,3 km ONO; 8.6.93, Nr. 165/93, H. Zoerner (DEI).

M-Deutschland.

### 11. *Mesochorus fraterculus*, spec. nov.

**Beschreibung.** ♀, ♂: 4.5-4.9 mm; Schläfe = Augenbreit; Ocellus < Vertexbrücke; Mesopleuren relativ stark punktiert; Stigma gleichschenklig; Bohrer = Tarsus III, 1, zur Spitze stark verjüngt; Gesicht schwarz, Orbiten bis Ocellen heller; Thorax schwarz; Stigma dunkelbraun; Tibia-III-Ende ⅛ verdunkelt; Abdomen schwarz, mit sehr schmalen hellen Tergit-Endrändern (♀), Tergit 3 sanduhrförmig gelblich (♂).

**Typen.** Holotypus: ♀, Messaure/S, 1.7.71, K. Müller (AEI). – Paratypen: 2♀♀, 2♂♂, dto.

Schweden.

### 12. *Mesochorus fulvipes*, spec. nov.

**Beschreibung.** ♀, ♂: 6-6.7 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren relativ stark punktiert; Bohrer < Tarsus III, 1, am Ende relativ stark verjüngt; Gesicht gebräunt; Orbiten gelbweiß; Thorax schwarz; Stigma schwarzbraun; Tibia-III-Ende hell; Abdomen schwarz, mit sehr schmalem hellem Tergit-2-Endband.

♂: 5.7-6.4 mm; wie ♀, aber: Gesicht gelbweiß; Thorax-Seite gelbrot; Mesoscutum-Zeichnung und Scutellum-Seiten rot; Griffel schmal, zur Spitze dünner, = Tarsus III, 2.

**Typen.** Holotypus: ♀, Hildesheim/D, 25.7.52, E. Bauer (ZSM). – Paratypen: 1♀, 1♂, Dessau/D, Nr. 121/88 und 86/92 sowie 1♂, Jena/D, Nr. 115/88, H. Zoerner (DEI); 1♀, Luko, Fläming/D, W. Schwenke (ZSM).

Ex *Pachyprotasis* (Tenthredinidae) via *Stiphrosomus* (Ichneumonidae) (Bauer).
Deutschland.

### 13. *Mesochorus sublimis*, spec. nov.

**Beschreibung.** ♀: 5-5.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Postpetiolus mit großer Längsgrube und einigen Längsrippen; Bohrer = Tarsus III, 1; Gesicht schwarz, mit hellen schmalen Facial- und breiteren Frontal-Orbiten; Thorax schwarz; Mesoscutum und Scutellum-Seiten mit verwaschen-brauner Zeichnung; Stigma schwarzbraun; Tibia-III-Ende ⅕-⅙ schwarz; Abdomen schwarz; Tergit 2 mit schmalem, folgende Tergite mit sehr schmalem hellem Endrand.

**Typen.** Holotypus: ♀, Graubünden/CH, Sent Surains, Val Gronda, 1.500 m, 30.7.73, E. Haeselbarth (ZSM). – Paratypen: 1♀, dto; 1♀, Limonetto, CH, Piem./I, 1.700 m, A. Scaramozzino; 3♀♀, Schweizer Jura/CH, A. Seyrig (Paris).

Westalpen.

### 14. *Mesochorus pyrenaeus*, spec. nov.

**Beschreibung.** ♀: 6.8 mm; Schläfe < Augenbreite; Ocellus = Vertexbrücke; Mesopleuren schütter punktiert; Bohrer < Tarsus III, 1; Gesicht schwarz, mit rötlichen schmalen Facial- und breiteren Frontal-Orbiten; Thorax schwarz; Scutellum-Seiten verwaschen braun; Stigma hellbraun; Tibia-III-Ende ⅙ geschwärzt; Abdomen schwarz; Tergit 2 mit schmalem hellem Endrand.

**Typen.** Holotypus: ♀, Eyne-Tal, Pyren./F, 18.7.62, ? leg. (Paris).

Pyrenäen.

### 15. *Mesochorus curvicaudus* Thomson

*Mesochorus curvicaudus* Thomson, 1885: 335, ♀ ♂.

**Diagnose.** ♀, ♂: 5.5-5.8 mm; Schläfe < Augenbreite; Ocellen < Vertexbrücke; Mesopleuren ziemlich stark punktiert; Stigma vergrößert und verbreitert; Postpetiolus mit Delle; Bohrer sehr lang (= Tarsus III, 1 + 2) und breit, auffällig nach unten gebogen (Abb. 1C); Gesicht und Clypeus schwarz, mit rötlichen Facial-Orbiten; Thorax schwarz; Mesoscutum und Scutellum mit braunen Wischen; Stigma schwarzbraun; Thorax schwarz; Coxa III rot, braun gefleckt; Tibia-III-Ende ⅙ geschwärzt.

♂ wie ♀, aber: Gesicht über rotem Clypeus nur gebräunt; Thorax ganz schwarz; Mesopleuren nur schütter punktiert; Tergit-2-Endrand ca. 1/12 weiß; Tergit 3 von Basis bis Mitte mit weißlicher Lasche; Griffel schlank, etwas > Tarsus III, 2.

**Typen.** Lectotypus: ♀, W. Schwenke 1968 (UZI Lund).-1♀, 1♂, Schweden, coll. Thomson; 1♀, Halle/D ("Lett. Moor") (ZSM); 1♂, Pyrenäen/F, Col. Pourtalet (Paris).

Fundorte in Schweden, Deutschland, Frankreich (Pyrenäen).
N-, M- und SW-Europa.

### 16. *Mesochorus tetricus* Holmgren

*Mesochorus tetricus* Holmgren, 1858: 122, ♀ ♂.
*Mesochorus macrurus* Thomson, 1885: 342, ♂; **syn nov.** nach Lectotypus.

**Diagnose.** ♀, ♂: 5-5.3 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer sehr lang (= Tarsus III, 1 + 2), breit; Gesicht und Clypeus schwarz, mit schmalen hellen Orbiten; Thorax schwarz; Mesoscutum und Scutellum meist mit braunen Wischen; Mesopleuren manchmal schwarz und rot; Stigma schwarzbraun; Coxa III braun gefleckt; Tibia-III-Ende ⅓ geschwärzt; Abdomen schwarz; Tergit-2-Endrand schmal hell, zuweilen Tergit 2 apikal mit Rotschimmer; ♂ wie ♀, aber: Gesicht gelbweiß; Prothorax und Mesopleuren rot und schwarz; Stigma heller braun; Coxa III hell; Tergit-2-Endrand breiter hell; Tergit-3-Basalrand gelblich.

**Typen.** Coll. Holmgren (Stockholm). – *M. macrurus* Thomson: Lectotypus: ♀, Schwenke 1968 (UZI Lund).

Ex *Laspeyresia* (Gauss), *Zeiraphera* (Del.), *Epiblema* (Füh.) (alle Tortricidae).
Fundorte in Schweden, Polen, Deutschland, Tschechien, Österreich, Schweiz, Frankreich, N-Italien.
Europa außer England und E-Europa.

### 17. *Mesochorus perugianus*, spec. nov.

**Beschreibung.** ♀: 5.7 mm; Schläfe < Augenbreite; Ocellus = Vertexbrücke; Mesopleuren stark punktiert; Stigma klein; Area petiolus sehr groß; Postpetiolus mit Delle; Bohrer zur Spitze verdünnt, = Tarsus III, 1; Gesicht und Clypeus schwarz; Facial-Orbiten schmal, heller; Pro- und Mesothorax schwarz und rot; Metathorax schwarz; Stigma schwarzbraun; Coxa III dunkelbraun; Femur III außen stark gebräunt; Tibia-III-Ende ¼ geschwärzt; Abdomen schwarz, mit sehr schmalen hellen Segmentgrenzen.

**Typen.** Holotypus: ♀, Perugia/I, Mte de Peglia, 550 m, 1.-9.11.78, leg. F. Bin (Scaramozzino).

E-Italien.

### 18. *Mesochorus mirabilis*, spec. nov.

**Beschreibung.** ♀: 5.2 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Postpetiolus mit Delle; Bohrer am Ende mäßig verdünnt, < Tarsus III, 1; Gesicht und Clypeus schwarz; Facial-Orbiten relativ breit, weiß; Frontal-Orbiten neben Fühlern mit weißem Dreieck; Thorax schwarz; Mesoscutum und Scutellum rot, mit undeutlichen braunen Wischen; auch Pronotum und Mesopleuren rot; Stigma schwarzbraun; Coxa III rot, braun gefleckt; Tibia-III-Ende ⅕ geschwärzt; Abdomen schwarz.

**Typen.** Holotypus: ♀, Alpes mar./F, Peira Cava, 1.500-2.000 m, 1931, A. Seyrig (Paris).

Französ. Alpen.

### 19. *Mesochorus plebejanus*, spec. nov.

**Beschreibung.** ♀: 4.8-5.0 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer fast spitz, < Tarsus III, 1; Clypeus und Gesicht schwarz, mit schmalen hellen Orbiten; Thorax schwarz; Mesoscutum mit rotbrauner H-Zeichnung; Scutellum seitlich rot; Stigma schwarzbraun; Coxa III braun verdunkelt; Tibia-III-Ende ⅕ geschwärzt; Abdomen schwarz; Tergit-2-Endrand schmal, heller.

**Typen.** Holotypus: ♀, Margetshöchheim b. Würzburg/D, 19.7./4.8.92, K. Fiedler (Horstmann), Ex *Polyommatus* (Zygaenidae) via *Campoplegini* (Ichneumonidae) (Fied.). – Paratypus: 1♀, dto.

Deutschland.

### 20. *Mesochorus angustatus* Thomson

*Mesochorus angustatus* Thomson, 1885: 343, ♀ ♂.

**Diagnose.** ♀, ♂: 3.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren relativ stark punktiert; Bohrer < Tarsus III, 1, am Ende aufgebogen; Gesicht rot, Clypeus braun-fleckig; Facial- und Frontal-Orbiten heller; Thorax schwarz, mit brauner Zeichnung auf Mesoscutum und Scutellum; Stigma hyalin; Coxa III braun verdunkelt; Tibia-III-Ende schmal verdunkelt; Abdomen schwarz, mit sehr schmalen hellen Endrändern, selten: Tergit 2 und folgende mit Rotschimmer.

♂ wie ♀, aber: Gesicht nur gebräunt; Abdomen ab Tergit 3 mit Rotfärbungen auf den Segmenten; Griffel > Tarsus III, 2.

**Typen.** Lectotypus: ♀, Schwenke 1968 (UZI Lund).

Fundorte in Schweden, Polen, Deutschland, Österreich, N-Italien.
N- und M-Europa.

### 21. *Mesochorus caliginosus*, spec. nov.

**Beschreibung.** ♀, ♂: 6.2-6.5 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Bohrer < Tarsus III, 1; Griffel etwas > Tarsus III, 2; Postpetiolus mit Furche; Gesicht schwarz (♀), gebräunt (♂); Facial-Orbiten schmal rot, Frontal-Orbiten breiter rot, neben Fühlern dreieckig weiß; Stigma bräunlich(-hyalin); Coxa III stark verdunkelt; Tibia-III-Ende unscharf schmal gebräunt; Thorax und Abdomen schwarz, beim ♂ Tergite 3 + 4 apikal rötlich.

**Typen.** Holotypus: ♀, Mittenwald, Obb./D, Ferchensee, 8.67, W. Schwenke (ZSM). – Paratypus: 1♂, Glonn, Obb./D, 7.71, W. Schwenke (ZSM).

Nördl. Alpen und bayer. Alpenvorland.

### 22. *Mesochorus parvioculatus*, spec. nov.

**Beschreibung.** ♀: 3.5 mm; Schläfe < Augenbreite; Ocellus sehr klein; Bohrer = Tarsus III, 1; Gesicht schwarz, mit schmalen rötlichen Orbiten, neben Fühlern dreieckig weiß; Thorax schwarz; Stigma schmutzig hyalin; Coxa III schwarz; Tibia-III-Ende ⅕ geschwärzt; Abdomen schwarz, mit sehr schmalen hellen Segment-Endrändern; Tergit 3 mit Rotschimmer.

**Typen.** Holotypus: ♀, Piemonte, To./I, Pietrabianca di Bussoleno, 900 m, 6.81, G. Boffa (Scaramozzino). – Paratypus; 1♀, dto.

N-Italien.

### 23. *Mesochorus albifacies*, spec. nov.

**Beschreibung.** ♂: 5 mm; Schläfe < Augenbreite; Ocellus viel < Vertexbrücke; Mesopleuren dicht flach punktiert; Griffel = Tarsus III, 2; Gesicht weiß; Thorax schwarz; Mesopleuren oben (¼) schwarz, unten (¾) rot; Stigma braunschwarz; Coxa III rot; Tibia-III-Ende ¼ schwarz; Abdomen schwarz; Tergit 2 mit schmalem rötlichem Endrand.

**Typen.** Holotypus: ♂, Eisenberg, Thür./D, Nr. 196/88, 19.8.88, H. Zoerner (DEI).

M-Deutschland.

### 24. *Mesochorus trentinus*, spec. nov.

**Beschreibung.** ♂: 4.0 mm; Schläfe < Augenbreite; Ocellus = Vertexbrücke; Mesopleuren stark punktiert; Griffel = Tarsus III, 2, kurz-nadelspitz; Gesicht rot, mit schwarzen Flecken; Thorax rot; Mesoscutum braun, mit gelber H-Makel; Metanotum basal ¾ braun; Mesopleuren rot, braun gefleckt; Stigma hyalin; Tibia-III-Ende ⅕ geschwärzt; Tergit 1 schwarzbraun, mit roter Basis; Tergit 2 schwarzbraun, mit ⅕ rötlichem Apikalsaum; Tergit 3 dunkelrot, mit dunkelbraunen Seiten; folgende Tergite schwarzbraun.

**Typen.** Holotypus: ♂, Tiarno de Sopra, Trentino/I, 850 m, 28.4.66, E. Haeselbarth (ZSM).

Ital. Alpen.

### 25. *Mesochorus kirunae*, spec. nov.

**Beschreibung.** ♂: 4.8 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Stigma fast gleichschenklig; Nervulus praefurkal; Postpetiolus mit Furche, Tergit 2 basal mit Längseindruck; Griffel > Tarsus III, 2, etwas nach unten gebogen; Gesicht gelb, etwas braun gefleckt, mit weißen Orbiten; Prothorax gelbrot, übriger Thorax schwarz; Mesosternum mit roter H-Zeichnung; Scutellum seitlich rot; Coxa III schwach gebräunt; Stigma dunkelbraun; Tibia-III-Ende ¼ schwarz; Abdomen schwarz; Tergit 2 apikal und Tergit 3 basal verwaschen rot.

**Typen.** Holotypus: ♂, Kiruna/S, 2.8.68, H. Hinz (ZSM).

N-Schweden.

### 26. *Mesochorus rupesus*, spec. nov.

**Beschreibung.** ♂: 5.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Griffel dünn, = Tarsus III, 2; Gesicht gebräunt, mit helleren Orbiten; Thorax schwarz; Stigma (oben hyalin, unten:) graubraun; Coxa III gelbrot, Oberseite verdunkelt; Tibia-III-Ende ⅓ schwarz; Abdomen schwarz; Tergit-2-Ende schmal weiß; Tergit 3 mit rotem Schimmer.

**Typen.** Holotypus: ♂, Oberfennberg, Kurtasch/I, 1.300 m, 1.6.76, E. Diller (ZSM). – Paratypus: 1♀, ohne Abdomen, dto.

SE-Alpen.

### Gruppe 7.4. *rufopetiolatus*

**Diagnose.** Abdomen: Hell-Dunkel (HD)

### *Mesochorus rufopetiolatus*, spec. nov.

**Beschreibung.** ♀, ♂: 3.5-4.5 mm; Schläfe viel < Augenbreite; Ocellus > Vertexbrücke; Stigma lang und schmal; Bohrer = Tarsus III, 1; Griffel < Tarsus III, 2; Kopf schwarz, mit schmalen helleren Orbiten; Thorax rot, mit braunen Mesoscutum-Wischen; Stigma hyalin; Tibia-III-Ende ¼-⅓ unscharf verdunkelt; Abdomen schwarz; Tergite 1 + 2 + Basis 3 rot.

**Typen.** Holotypus: ♀, Arzberg, Bay./D, 6.68, via *Apanteles*-Kokon an *Pinus*-Nadel, W. Schwenke (ZSM). – Paratypen: 1♀, dto; 1♀, Kassel/D, E. Führer (ZSM); 1♂, Piemysl/PL, J. Sawoniewicz (Warschau).

Ex *Semiothisa* (Geometridae) (Füh.).
Deutschland, Polen.

### Gruppe 7.5. *declinans*

**Diagnose.** Abdomen: Dunkel-Hell (DH) [auch helle (gelbe, rote) Tergite mit seitlichen Verdunklungen gelten als hell].

### Bestimmungstabelle der Arten (♀♀)

1(32) Stigma (überwiegend) hyalin, gelb oder weiß

2(17) Bohrer ≥ Tarsus III, 1

3(8) Tibia-III-Ende breit (min. ⅙) dunkel

4(5) Stigma weiß; Tergit 2 ganz rot ........ 1. *malaiseus*, spec. nov. (S. 83)

5(4) Stigma hyalin; Tergit 2 schwarz + rot (-gelb)

6(7) [Tergit 2 mit weißem Endband (Exemplar mit Rotfärbung ab Tergit 4) ........ p4. *septentrionalis*, spec. nov.] (S. 99)

7(6) Tergit 2 mit rotem Dreieck ........ 2. *veluminis*, spec. nov. (S. 83)

8(3) Tibia-III-Ende schmal (max. ⅐) dunkel

9(10) Ocellus > Vertexbrücke ........ 3. *pharaonis*, spec. nov. (S. 83)

10(9) Ocellus ≤ Vertexbrücke

11(12) Schläfe > Augenbreite ........ 4. *robustus*, spec. nov. (S. 84)

12(11) Schläfe ≤ Augenbreite

13(16) Bohrer = Tarsus III, 1

14(15) [Postpetiolus längsgerieft (Exemplar mit roter Abdomen-Mitte) ........ a9. *giberius* Thunberg] (S. 75)

15(14) Postpetiolus glatt ........ 5. *aquilonis*, spec. nov. (S. 84)

16(13) Bohrer > Tarsus III, 1 ........ 6. *clarus*, spec. nov. (S. 84)

17(2) Bohrer < Tarsus III, 1

18(19) Untere Mandibelzahn > oberer ........ 7. *vitticollis* Holmgren (S. 84)

19(18) Beide Mandibelzähne gleich

20(21) Tarsen-Endglieder verbreitert ........ 8. *globulatur* Thunnerg (S. 85)

21(20) Tarsen-Endglieder normal

22(27) Tibia-III-Ende breit (min. ⅙) dunkel

23(24) Gesicht gelbrot ........ 9. *alveus*, spec. nov. (S. 85)

24(23) Gesicht braun verdunkelt

25(26) Mesoscutum + Scutellum schwarz ........ 10. *lacus*, spec. nov. (S. 85)

26(25) Mesoscutum + Scutellum schwarz + rot ........ 11. *prothoracicus*, spec. (S. 85)

27(22) Tibia-III-Ende schmal (max. ⅐) dunkel

28(29) Mesopleuren schwarz ........ 12. *castellanus*, spec. nov. (S. 86)

29(28) Mesopleuren rot oder braun

30(31) Tergit 1 basal schwarz ........ 13. *pallipes* Brischke (S. 86)

31(30) Tergit 1 basal rot ........ 14. *boreomontanus*, spec. nov. (S. 86)

32(1) Stigma (überwiegend) braun

33(48) Bohrer ≥ Tarsus III, 1

34(35) Tibia-III-Ende schmal (max. ⅐) verdunkelt; Gesichtsränder divergierend ........ 15. *dimidiator* Aubert (S. 86)

35(34) Tibia-III-Ende breit (min. ⅙) dunkel

36(37) Schläfe > Augenbreite ........ 16. *caligator*, spec. nov. (S. 87)

37(36) Schläfe < Augenbreite

38(41) Tibia-III-Ende ⅕-⅙ geschwärzt

39(40) Tergite 1 + 2 sehr lang und schmal ........ 17. *tenuis*, spec. nov. (S. 87)

40(39) Tergite 1 + 2 kürzer und breiter ........ 18. *columbinus*, spec. nov. (S. 87)

41(38) Tibia-III-Ende ¼-⅓ geschwärzt

42(45) Gesicht gelb oder rot

43(44) Ocellus = Vertexbrücke ........ 19. *confusus* Holmgren (S. 87)

44(43) Ocellus < Vertexbrücke ........ 20. *calidus*, spec. nov. (S. 88)

45(42) Gesicht braun oder schwarz

46(47) Tergit 2 rot ........ 21. *valdierius*, spec. nov. (S. 88)

47(46) [Tergit 2 schwarz + rot (Indiv. mit Bohrer = Tarsus III, 1) ........ 30. *semirufus* Holmgren] (S. 90)

48(33) Bohrer < Tarsus III, 1

49(84) Tibia-III-Ende breit (min. ⅙) dunkel

50(59) Schläfe ≥ Augenbreite

51(52) Areola-Nerv a3 fehlend ............ 22. *obliterator* Aubert (S. 88)

52(51) a3 vorhanden

53(54) Nervulus postfurkal ............ 23. *extraordinarius*, spec. nov. (S. 89)

54(53) Nervulus interstitial

55(56) Mesopleuren (überwiegend) rot ............ 24. *tenthredinidis*, spec. nov. (S. 89)

56(55) Mesopleuren schwarz

57(58) Bohrer-Ende breit ............ 25. *slawicus*, spec. nov. (S. 89)

58(57) Bohrer-Ende fast spitz ............ 26. *longurius*, spec. nov. (S. 89)

59(50) Schläfe < Augenbreite

60(61) Areola-Nerv a4 + ableitender Nerv unterbrochen ............ 27. *intermissus*, spec. nov. (S. 90)

61(60) Nerven vollständig

62(63) Femur III + Tibia III extrem (ca. ½) geschwärzt ............ 28. *declinans* Habermehl (S. 90)

63(62) Femur III und Tibia III weniger geschwärzt

64(65) Tergit 2 mit dreieckigem rotem Fleck ............ 29. *triangulus*, spec. nov. (S. 90)

65(64) Tergit 2 anders gefärbt

66(73) Scutellum schwarz

67(68) Tergit-2-Ende ⅕ rot ............ 30. *semirufus* Holmgren (S. 90)

68(67) Tergit-2-Ende ca. ⅒ weißgelb

69(70) Tergit 3 ganz rot ............ 31. *suomiensis*, spec. nov. (S. 91)

70(69) Tergit 3 schwarz + rot

71(72) Prothorax schwarz ............ 32. *acutus*, spec. nov. (S. 91)

72(71) Prothorax rot ............ 33. *iburganus*, spec. nov. (S. 91)

73(66) Scutellum rot, braun oder schwarz + rot

74(77) Scutellum rot oder braun

75(76) Scutellum rot; Stigma schwarzbraun ............ 34. *mellis*, spec. nov. (S. 91)

76(75) Scutellum braun; Stigma hellbraun ............ 35. *skaneus*, spec. nov. (S. 92)

77(74) Scutellum schwarz + rot(-braun)

78(81) Mesopleuren schwarz

79(80) Klauen gezähnt ............ 36. *vittator* Zetterstedt (S. 92

80(79) Klauen ungezähnt ............ 37. *zyganaus*, spec. nov. (S. 92)

81(78) Mesopleuren (überwiegend) rot

82(83) Stigma hyalin-braun ............ 38. *orbis*, spec. nov. (S. 92)

83(82) Stigma schwarzbraun ............ 39. *anglicus*, spec. nov. (S. 93)

84(49) Tibia-III-Ende schmal (max. ⅐) dunkel

85(90) Gesicht schwarz oder verdunkelt

86(87) Ocellus > Vertexbrücke ............ 40. *artus*, spec. nov. (S. 93)

87(86) Ocellus < Vertexbrücke

88(89) Stigma dunkelbraun; Mesopleuren dicht punktiert ........................ 41. *rufoniger* Brischke (S. 93)

89(88) Stigma hellbraun; Mesopleuren glatt oder schütter punktiert ......... 42. *doleri*, spec. nov. (S. 93)

90(85) Gesicht (gelb-)rot

91(94) Mesopleuren (gelb-)rot

92(93) Beine rot; Postpetiolus gefurcht ...................................................... 43. *fennicus*, spec. nov. (S. 94)

93(92) Beine weiß; Postpetiolus glatt .............................................................. 44. *moskwanus*, spec. (S. 94)

94(91) Mesopleuren (rot +)schwarz(-braun); unterer Mandibelzahn > oberer ........................................
.................................................................................................................... 45. *testaceus* Gravenhorst (S. 94)

Die ♂♂ der Gruppe *declinans* Habermehl sind wegen farblicher Überschneidungen mit einem Teil der ♂♂ der Gruppe *angustatus* Thomson sowie mit den ♂♂ der Gruppe *pectoralis* Ratzeburg zum Schlüssel "♂♂ mit Rotfärbung im mittleren oder/und hinteren Abdomen" zusammengefaßt (S. 115).

### 1. *Mesochorus malaiseus*, spec. nov.

**Beschreibung.** ♀: 3.6 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer > Tarsus III, 1, schmal; Gesicht schwarz, mit schmalen roten Orbiten; Thorax schwarz; Stigma weiß, schillernd; Coxa III verdunkelt; Tibia-III-Ende ¼ geschwärzt; Abdomen schwarz; Tergit 1 basal rot; Tergit 2 ganz rot; Tergit-3-Spitze rot; folgende Tergite rot.

**Typen.** Holotypus: ♀, Skåne/S, 8.69, Falle 1, Bo Svensson (AEI) (verloren).

S-Schweden.

### 2. *Mesochorus veluminis*, spec. nov.

**Beschreibung.** ♀: 4.0 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren schütter punktiert; Bohrer = Tarsus III, 1, schmal; Gesicht gelbrot; Prothorax rot und schwarz, übriger Thorax schwarz; Mesoscutum mit flächiger roter Makel; Scutellum fast ganz gelbrot; Stigma schmutzig-hyalin; Tibia III weiß, am Ende ⅕ geschwärzt; Abdomen schwarz; Tergit 1 basal dunkelrot; Tergit-2-Endrand ⅙ gelb, von ihm aus zur Tergit-Mitte ein schmales gelbes Dreieck, vorhangartig (Name); Tergit 3 gelbrot, mit seitlichen Verdunklungen.

**Typen.** Holotypus: ♀, Polen, Nr. 925 (Warschau).

Polen.

### 3. *Mesochorus pharaonis*, spec. nov.

**Beschreibung.** ♀, ♂: 4-4.2 mm; Schläfe < Augenbreite; Ocellus extrem groß (2mal Vertexbrücke); Nervulus praefurkal; Bohrer = Tarsus III, 1, breit; Griffel kurz und breit, < Tarsus III, 2; Gesicht rot, mit Verdunklungen; Thorax rot, größter Teil des Mesoscutum und Metanotum basal braun; Mesoscutum mit 4 schmalen Längsstreifen; Stigma hyalin; Tibia-III-Ende unverdunkelt; Petiolus 1 Basalhälfte dunkelrot, Apikalhälfte ½ braun, ½ gelb; Tergite 2 + 3 braun, mit je einem gelben Dreieck von der Basis zur Tergit-Mitte; ab Tergit 4 gelb/braun gebändert.

**Typen.** Holotypus: ♀, Wadi Katara, Niltal/Ägypten, 10 km nördl. Assuan, 23.3.88, M. Schwarz, Abdomen auf Fundort-Etikett geklebt (Schwarz). – Paratypus: 1♂, dto.

Ägypten.

### 4. *Mesochorus robustus*, spec. nov.

**Beschreibung.** ♀: 5.5 mm; Schläfe > Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert und gerunzelt; Stigma schmal; Postpetiolus und Tergit 2 mit Rinne; Bohrer = Tarsus III, 1, am Ende dünner; Gesicht rot, dunkel gefleckt; Vertexbrücke gelbweiß Thorax schwarz; Stigma überwiegend hyalin; Coxa III verdunkelt; Abdomen schwarz; Tergit-2-Endrand schmal weiß, von diesem undeutliche Rotförbung bis ⅓ der Länge; Tergit 3 rot, seitlich verdunkelt; ab Tergit 4 rot.

**Typen.** Holotypus: ♀, Kiruna/S, 19.7.64, R. Hinz (ZSM).

N-Schweden.

### 5. *Mesochorus aquilonis*, spec. nov.

**Beschreibung.** ♀, ♂: 4.8-5.8 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren ziemlich dicht punktiert; Tergite 1 + 2 + 3 beim ♂ lang und schmal; Bohrer = Tarsus III, 1, schmal; Griffel > Tarsus III, 2, dünn, unverjüngt; Gesicht gebräunt; Facial-Orbiten weißlich; Pro- und Mesothorax schwarz und rot, Metathorax schwarz; Stigma hyalin; Tibia-III-Ende ⅙-⅐ verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit breitem roten Endrand oder -fleck; ab Tergit 3 rot, beim ♀ mit seitlichen Verdunklungen.

**Typen.** Holotypus: ♀, Abisko/S, 16.7.64, R. Hinz (ZSM). – Paratypen: 5♀♀, 3♂♂, Schweden, Bo Svensson (AEI); Polen, J. Sawoniewicz (Warschau); Deutschland, H. Zoerner (DEI).

Schweden, Polen, östl. Deutschland.

### 6. *Mesochorus clarus*, spec. nov.

**Beschreibung.** ♀: 5.5-7.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Bohrer > Tarsus III, 1, breit, etwas gebogen; Gesicht verdunkelt, Orbiten heller, neben Fühlern kleines weißes Dreieck; Prothorax und Mesoscutum schwarz und rot, übriger Thorax schwarz; Stigma hyalin; Tibia-III-Ende schmal verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅙-⅛ rotem Endrand; folgende Tergite gelbrot, mit leichten Verdunklungen.

**Typen.** Holotypus: ♀, Courmajor/I, 6.7.76; E 670000/N 454800, R. Hinz (ZSM). – Paratypen: 3♀♀, Piemonte Cuneo/I (Scaramozzino); 2♀♀, Col des Montets/F, 1♀, Kandersteg/CH, R. Hinz (ZSM).

W- und S-Alpen.

### 7. *Mesochorus vitticollis* Holmgren

*Mesochorus vitticollis* Holmgren, 1858: 128, ♀ ♂.
*Mesochorus hungaricus* Szépligeti, 1914: 184♀; **syn. nov.** nach Lectotypus.

**Diagnose.** ♀, ♂: 6.8-9.3 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; unterer Mandibelzahn > oberer; Mesopleuren stark punktiert; Bohrer < Tarsus III, 1; Griffel > Tarsus III, 2, klobig; Gesicht gelb, mit weißen Orbiten; Thorax schwarz und rot; rot bei ♀: Prothorax und meist Mesopleuren, Mesoscutum und Scutellum, bei ♂: ganzer Thorax, außer schwarzer Metanotum-Basalhälfte; Stigma hyalingelb; Tibia-III-Ende schmal verdunkelt; Tergit 1 schwarz, Tergit 2 schwarz, mit ¼ bogenförmigem roten Ende, ab Tergit 3 gelbrot, mit Verdunklungen. Beim ♂ Rotfärbung dunkler, ab Tergit 4 rot oder heller/dunkler vespoid.

**Typen.** Coll. Holmgren (Stockholm). – *M. hungaricus* Szépligeti: Lectotypus: ♀, Moczár 1968, 124 (Budapest).

Häufige Art; trotzdem kaum Wirtsnachweise.
Ex *Fidonia* (Geometridae) via *Campoplex* (Ichneumonidae) und ex *Cucullia* (Noctuidae) via *Microgaster* (Braconidae) (Schmied.).

In allen Teilen Europas; Türkei, Rußland.
Europa, Asien.

### 8. *Mesochorus globulator* (Thunberg)

*Ichneumon globulator* Thunberg, 1822: 266, ♀.
*Mesochorus dimidiatus* Holmgren, 1858: 118, ♂; syn. Roman 1912, 229-293.
*Mesochorus crassimanus* Holmgren, 1858: 125, ♂♀; syn. Roman 1912, 229-293.

**Diagnose.** ♀, ♂: 5.1-6.7 mm; Schläfe < Wangenbreite; Ocellus < Vertexbrücke; ♀ Klauenendglieder etwas ballonförmig aufgebläht, ♂ normal; Bohrer < Tarsus III, 1, dick; Gesicht gelbrot, in der Mitte gebräunt; Thorax schwarz; Stigma schmutzig hyalin; Tibia-III-Ende schmal verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅛-⅙ gelbrotem Endrand; ab Tergit 3 rot, mit schwachen (♀) bzw. stärkeren (♂) Verdunklungen; ♂ Mittelstreifen rot, seitlich dunkel.

**Typen.** Verschollen. – *M. crassimanus* Holmgren: Lectotypus: ♀, Aubert 1962 (Stockholm). – *M. dimidiatus* Holmgren: Lectotypus: ♂, Hinz 1962 "Lp. Bhn. 30/6" (Stockholm).

Fundorte in Schweden, Polen, Deutschland, Alpenländern.
N- und M-Europa einschl. Alpen.

### 9. *Mesochorus alveus*, spec. nov.

**Beschreibung.** ♀: 4.7 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Stigma gleichschenklig; Postpetiolus mit Delle und Furchen; Bohrer < Tarsus III, 1, dünn; Gesicht rot; Thorax schwarz; Mesoscutum mit brauner Makel; Scutellum mit roten Seiten; Stigma oben hyalin; Tibia-III-Ende mit ¼-⅓ schwarzem Ende; Tergit 1 schwarz; Tergit 2 schwarz, mit ¼ gelbem Endband; folgende Tergite gelbrot.

**Typen.** Holotypus:♀, Hamernia at Warszawa/PL, 27.5.77, c2, IZ PAN Ekipa (Warschau).

Polen.

### 10. *Mesochorus lacus*, spec. nov.

**Beschreibung.** ♀, ♂: 4-4.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer < Tarsus III, 1, dick; Griffel = Tarsus III, 2, stabförmig; Gesicht ♂ gelb, ♀ rot, mit braunen Flecken; Thorax schwarz; beim ♂ Prothorax rotgelb; Mesoscutum mit brauner H-Makel; Scutellum seitlich rot; beim ♂ Mesopleuren braun und rot; Stigma trüb-hyalin; Femur III gebräunt; Tibia-III-Ende ⅓ geschwärzt; Tergit 1 schwarz, mit roter Basis; Tergit 2 schwarz, mit schmalem weißen Endband; übrige Tergite rot, beim ♂ dunkler als beim ♀, seitlich etwas verdunkelt.

**Typen.** Holotypus: ♀, Campi Riva Garda/I, 1.500 m, 7.9.67, E. Haeselbarth (ZSM). – Paratypus: 1♂, Brunnsee/A, (leg. ?) (ZSM).

Ex *Pristiphora* (Tenthredinidae) (leg. ?).
Deutschland, Österreich.

### 11. *Mesochorus prothoracicus*, spec. nov.

**Beschreibung.** ♀: 4.0 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer < Tarsus III, 1, dick, am Ende stark verjüngt; Gesicht gebräunt, Orbiten breit gelbweiß, neben Fühlern dreieckig weiß; Prothorax rot, übriger Thorax schwarz; Stigma hyalin; Tibia III weiß, Ende ¼ schwarz; Tergit 1 schwarz; Tergit-2-Ende 1/12 weiß; folgende Tergite gelbrot, mit leichten Verdunklungen.

**Typen.** Holotypus: ♀, Skåne /S, 9.69, Falle 4, Bo Svensson (AEI).

Schweden.

### 12. *Mesochorus castellanus*, spec. nov.

**Beschreibung.** ♀, ♂: 4.3-5 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Bohrer < Tarsus III, 1; Griffel = Tarsus III, 2, stabförmig, am Ende etwas verbreitert; Gesicht rot, in der Mitte gebräunt; Thorax schwarz; Stigma trüb-hyalin; Tibia-III-Ende schmal verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅙-⅛ roter Endbinde; ab Tergit 3 rot (♀), vespoid (♂).

**Typen.** Holotypus: ♀, Wittenberg/D, 10.-30.8.64, Lichtfalle H. Zoerner (DEI). – Paratypen: 1♀, Wittenberg, 1♂, Dessau/D, H. Zoerner (DEI); 1♀, (ohne Bohrer) Berlin-Wannsee/D, W. Schwenke (ZSM); 1♂, Harz/D, Eikertal, 30.5.37, E. Bauer (ZSM).

M-Europa.

### 13. *Mesochorus pallipes* Brischke

*Mesochorus pallipes* Brischke, 1880: 190, ♂.
*Mesochorus albipes* Thomson, 1886: 341, ♀; **syn. nov.** nach Lectotypus.

**Diagnose.** ♀, ♂: 5-7 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer < Tarsus III, 1, dick; Griffel ≥ Tarsus III, 2, zum Ende gleichmäßig verdünnt; Gesicht gelbrot bis braunrot, aber nicht verdunkelt; Orbiten gelbweiß; Thorax gelbrot, Mesoscutum mit brauner Makel; basale Hälfte des Metanotum braun; Stigma hyalin; Tibiae weiß, III-Ende ⅙ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ¼-⅕ rotem Endrand; ab Tergit 3 rot, z.T. seitlich verdunkelt.

**Typen.** Verschollen. – *M. albipes* Thomson: Lectotypus: ♀, Hinz 1962 (UZI Lund).

Fundorte in Schweden, Polen, Deutschland, England, Frankreich, Alpenländern.
N-, Mi und W-Europa, inkl. Alpen.

### 14. *Mesochorus boreomontanus*, spec. nov.

**Beschreibung.** ♀: 4.6-5.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Nervulus postfurkal; Mesopleuren dicht, aber flach punktiert; Bohrer £ Tarsus III, 1, zum Ende dünner und etwas aufgebogen; Gesicht rot, braun verdunkelt; Thorax braun; Mesoscutum-Makel, Scutellum-Seiten und Mesopleuren rot; Stigma hyalin; Tibia-III-Ende schmal undeutlich verdunkelt; Tergit 1 schwarz, mit roter Basis; Tergit 2 mit variierend breitem rotem Apikalteil; ab Tergit 3 rot, mit schwachen Verdunklungen.

**Typen.** Holotypus: ♀, Hinteres Sonnwendjoch/A, 1.300-1.500 m, 21.6.59, E. Haeselbarth (ZSM). – Paratypen: 1♀, Valdieri, Piem./I, 980 m, G. Della-Beffa (Scaramozzino); 1♀, Oshobotria/SF, R. Müller (AEI); 1♀, Schnett, Thür. Wald/D, H. Zoerner (DEI).

N-Europa, mitteleurop. Mittelgebirge, Alpen.

### 15. *Mesochorus dimidiator* Aubert

*Mesochorus dimidiator* Aubert, 1970: 73, ♀ ♂.
*Mesochorus dimidiatus* Brischke, 1880: ♀ ♂. Da dieser Name okkupiert ist von *M. dimidiatus* Holmgren, 1858, ♂, und dieser synonym ist zu *M. globulator* Thunberg, 1822, ♀ (s. Nr. 8), schuf Aubert den neuen Namen *M. dimidiator*.

**Diagnose.** ♀, ♂: 5.5-7.3 mm; Schläfe = Augenbreite; Gesicht stark quer, mit divergierenden Augenrändern; Ocellus < Vertexbrücke; Mesopleuren ± stark punktiert; Bohrer = Tarsus III, 1; Griffel viel > Tarsus III, 2, zum Ende stark verjüngt, fast spitz; Gesicht gelbweiß, mit breiten weißen Orbiten; Prothorax gelbrot; übriger Thorax schwarz, Meso- und Metapleuren sowie Metanotum apikales Drittel rot; Stigma schwarzbraun; Tibia-III-Ende schmal undeutlich verdunkelt; Tergit 1 schwarz, mit roter Basis; Tergit 2 schwarz, mit ⅙ rotem Endrand; Tergit 3 rot, seitlich verdunkelt; ab Tergit 4♀ rot, ♂ schwarzbraun, Mittel-Längsband undeutlich rot.

**Typen.** *M. dimidiatus* Holmgren, Lectotypus: ♀, Hinz 1962, "Lp Bhn. 30/6" StockHolmgren

Ex *Pristiphora, Pteronidea, Macrophya* (Tenthredinidae) via *Olesicampe* (Ichneumonidae) (Hz., Psch.W.). Fundorte in Schweden, Polen, Deutschland, N-Frankreich.
N- und M-Europa.

### 16. *Mesochorus caligator*, spec. nov.

**Beschreibung.** ♀: 7 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Postpetiolus mit Längsgruben; Bohrer = Tarsus III, 1, breit stabförmig; Gesicht gelbrot, Orbiten weiß, neben Fühlern weißes dreieck; Thorax gelbrot, nur obere ⅔ des Metanotums schwarz; Stigma schwarzbraun; Tibia-III-Ende ¼ schwarz; Tergit 1 schwarz, mit rotem Apikalfleck; Tergit 2 schwarz, mit ⅓ rotem Endband; folgende Tergite rot, mit schwachen Verdunklungen.

**Typen.** Holotypus: ♀, Frankavilla, Basilicato/I, 6.6.84, A. Scaramozzino (Scaramozzino).

Italien.

### 17. *Mesochorus tenuis*, spec. nov.

**Beschreibung.** ♀: 4 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Tergite 1 + 2 sehr schmal, langgestreckt; Bohrer = Tarsus III, 1; Gesicht gelbrot, braun gefleckt; Prothorax gelbrot, Mesothorax rot und braun, Metathorax schwarz; Stigma hyalin-graubraun; Tibia-III-Ende ¼-⅕ verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit ¼ gelbem Endrand; ab Tergit 3 rot, schwach vespoid.

**Typen.** Holotypus: ♀, Messaure/S, 6.9.71, K. Müller (AEI). – Paratypen: 6♀♀, dto.

Schweden.

### 18. *Mesochorus columbinus*, spec. nov.

**Beschreibung.** ♀, ♂: 5-6.5 mm; Schläfe < Augenbreite; Ocellus > Vertexbrücke; Bohrer = Tarsus III, 1; Griffel viel > Tarsus III, 2, stabförmig; Gesicht gelbrot, Orbiten gelbweiß, neben Fühlern dreieckig weiß; Thorax gelbrot, mit Bräunungen auf Meso- und Metanotum; Stigma schwarzbraun; Tibia-III-Ende ⅕-⅙ verdunkelt; Tergit 1 braun; Tergit 2 basal ⅔ braun, apikal ⅓ gelbrot; ab Tergit 3 gelbrot.

**Typen.** Holotypus: ♀, Taubenberg, Obb./D, 7.77, W. Schwenke (ZSM). – Paratypus: 1♂, Umg. Mittenwald, Karwendel, Obb./D, 19.7.58, E. Haeselbarth (ZSM).

S-Deutschland.

### 19. *Mesochorus confusus* Holmgren

*Mesochorus splendidulus* Ratzeburg, 1844: 148, ♀♂ partim; syn. Schmiedeknecht 1910: 1988.
*Mesochorus splendidulus* Holmgren, 1854: 59, ♀♂ partim; syn. Schmiedeknecht 1910: 1988.
*Mesochorus confusus* Holmgren, 1858: 129, ♀♂.
*Mesochorus sulphuripes* Brischke, 1880: 188, ♂; syn. Schmiedeknecht 1910: 1989.
*Mesochorus sericeus* Brischke, 1880: 188, ♂; syn. Schmiedeknecht 1910: 1989.
*Mesochorus gracilentus* Brischke, 1880: 188, ♂; syn. Schmiedeknecht 1910: 1990.
*Mesochorus rufipes* Brischke, 1880: 189, ♂; syn. Schmiedeknecht 1910: 1990.
*Mesochorus crassicrus* Thomson ,1885: 330, ♀♂; **syn. nov.** nach Lectotypus.
*Mesochorus longicaudus* Thomson, 1885: 338, ♀♂; **syn. nov.** nach Lectotypus.
*Mesochorus picticrus* Thomson, 1885: 340, ♀♂; **syn. nov.** nach Lectotypus.
*Mesochorus gallicator* Aubert, 1963: ♀♂; **syn. nov.** nach Lectotypus.

**Diagnose.** ♀, ♂: 5.4-7.8 mm; Schläfe < Augenbreite; Ocellus = Vertexbrücke; Areola sehr schief (a1 sehr kurz); Mesopleuren dicht flach punktiert; Bohrer dick und lang, = Tarsus III, 1; Griffel > Tarsus III, 2, dünn; Gesicht gelbrot, weiße Orbiten bis neben Fühlern; ♀ Pro- und Mesothorax gelbrot, Mesoscutum mit brauner H-Makel; Metanotum schwarz(-braun); ♂ Thorax ganz rot; braune H-Zeichnung auf Mesoscutum angedeutet; Stigma schwarzbraun; Tibia-III-Ende ¼-⅓ schwarz; Tergit 1 schwarz; Tergite 2 + 3 in unterschiedlichem Maße schwarz und/oder rot, am häufigsten: Tergit 2 schwarz, mit ⅕-⅓ rotem Endband; Tergit 3 rot, mit schwachen Verdunklungen; ab Tergit 4 rotgelb.

**Typen.** Lectotypus: ♀, Aubert 1968 (Stockholm). – *M. crassicrus* Thomson: Lectotypus: ♀, Schwenke 1968 (UZI Lund). – *M. longicaudus* Thomson:; Lectotypus: ♀, Aubert 1972 (UZI Lund). – *M. picticrus* Thomson: Lectotypus: ♀, Hinz 1962 (UZI Lund).

Ex *Yponomauta* (Yponomeutidae) via *Angitia* (Braconidae) (Vukasovic, 1928); ex *Lymantria* (Lymantriidae) via *Apanteles* (Braconidae) (Schedl 1936); ex *Gonapterys* (Pieridae) via *Eulimneria* (Ichneumonidae) (Bri.); ex *Eupithecia* (Geometridae) (Schmied.).
In allen Teilen Europas nachgewiesen.
Europa.

### 20. *Mesochorus calidus*, spec. nov.

**Beschreibung.** ♀: 4 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer = Tarsus III, 1, schmal; Gesicht rot, neben Fühlern dreieckig weiß; Thorax rot, mit brauner Mesoscutum-H-Makel; Stigma schwarzbraun; Coxa III verdunkelt; Tibia-III-Ende ¼ schwarz; Tergit 1 schwarz(-braun); Tergit 2 braun, in rot übergehend; Tergit 3 und folgende Tergite rot.

**Typen.** Holotypus: ♀, Alicante/E, Moreira, 900 m, 14.-22.5.89, Malaise-Falle, R. Wahis (Wahis).

Iberische Halbinsel.

### 21. *Mesochorus valdierius*, spec. nov.

**Beschreibung.** ♀, ♂: 4.8 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Griffel > Tarsus III, 2, stabförmig; Mesopleuren dicht punktiert; Bohrer ≥ Tarsus III, 1; Gesicht rot, in Mitte stark gebräunt; Thorax rot, mit braunen Wischen auf Mesoscutum und Mesopleuren; Stigma schwarzbraun; Tibia-III-Ende ¼ schwarz; Tergit 1 schwarz; Tergit 2 und folgende: mit durchgehend roter Mitte, seitlich gebräunt.

**Typen.** Holotypus: ♀, Valdieri, Piem./I, 980 m, 8.8.-23.9.88, G. Della Beffa (AEI). – Paratypus: 1♂, dto.

N-Italien.

### 22. *Mesochorus obliterator* Aubert

*Mesochorus obliterator* Aubert, 1965: 22, ♀.

**Diagnose.** ♀: 7.4 mm; Schläfe > Augenbreite; Ocellus < Vertexbrücke; Augenränder divergierend; Areola-Nerv a3 unvollständig; Femur-III-Sporn auffällig kurz, < ½ Tarsus III, 1; Bohrer < Tarsus III, 1; Gesicht gelb; Thorax gelbrot; Stigma schwarzbraun; Tibia-III-Ende ⅓ schwarz; Tergit 1 schwarz, mit breiter roter Basis und breitem rotem Endsaum; Tergit 2 schwarz, mit ⅔ gelbem Dreieck; Tergit 3 und folgende Tergite rot.

**Typen.** Holotypus: ♀, St. Imoges, Marne, 22.5.54, leg. Caruel (Aubert).

Frankreich.

### 23. *Mesochorus extraordinarius*, spec. nov.

**Beschreibung.** ♀: 6.8 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Stigma verschmälert; Nervulus postfurkal; Postpetiolus gefurcht; Bohrer etwas < Tarsus III, 1, schmal; Gesicht gelbrot; Thorax gelbrot; Mesoscutum + Scutellum + Metanotum + Fleck auf Mesopleuren schwarz; Stigma schwarzbraun; Tibia-III-Ende ⅕-¼ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ½ bogenförmigem rotem Endband; Tergit 3 rotbraun, schwach vespoid.

**Typen.** Holotypus: ♀, Harzburg/D, Radau-Tal, 9.9.56, E. Bauer (ZSM).

M-Europa.

### 24. *Mesochorus tenthredinidis*, spec. nov.

**Beschreibung.** ♀, ♂: 5.3-7.2 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren deutlich punktiert; Bohrer < Tarsus III, 1, schmal, zum Ende unterseits lang verdünnt; Griffel = Tarsus III, 2, schlank; Gesicht gelbrot; Thorax ♀ schwarz, Prothorax + Mesopleuren + Metapleuren rot, Mesoscutum mit brauner H-Makel und partiell rotem Schildchen; Thorax ♂ gelbrot, mit brauner H-Makel auf Mesoscutum und schwarzer Basal-Hälfte des Metanotums; Tergit 1 schwarz; Tergit 2 schwarz, mit breitem rotem Endband; ab Tergit 3 rot, meist mit Verdunklungen.

**Typen.** Holotypus: ♀, Garmisch, Obb./D, 700 m, 20.8.1950, E. Bauer (ZSM). – Paratypen: 14♀♀, 15♂♂, aus verschiedenen Teilen N- und M-Europas [Bauer (ZSM), Hinz (ZSM), Pschorn-Walcher (ZSM), Seyrig (Paris), Ulbrich (Krefeld)].

Ex *Pteronidea, Caliroa* (Psch.W.), *Arge, Phymatocera* (Hz.) (Tenthredinidae) via *Ipectorhinus* (Ichneumonidae) (Hz.).
N- und M-Europa bis N-Italien.

### 25. *Mesochorus slawicus*, spec. nov.

**Beschreibung.** ♀, ♂: 5.6-6.0 mm; Schläfe ≤ Augenbreite; Ocellus < Vertexbrücke; Mesopleuren schütter punktiert; Bohrer < Tarsus III, 1, schmal; Griffel sehr lang, = Tarsus III, 2 + 3, rot, stark verjüngt; Gesicht gelbrot; Thorax ♀ schwarz, ♂ Oberseite schwarz, Seiten braunrot; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅕-⅙ gelblichem Endrand; ab Tergit 3♀ braun/gelb gebändert, mit durchgehend roter Mitte; ♂ gelbrot.

**Typen.** Holotypus: ♀, Durmitor, Jugoslaw., Zabljak, LJM, 16.6.88 (ZSM). – Paratypen: 3♀♀, dto; Goszieradów/PL, J. Sawoniewicz (Warschau).

Polen, Balkan.

### 26. *Mesochorus longurius*, spec. nov.

**Beschreibung.** ♀: 5.5 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren deutlich punktiert; Bohrer = Tarsus III, 1, stabförmig, dünn, zum Ende verjüngt; Gesicht rot; Thorax schwarz; Tibia-III-Ende ¼-⅓ schwarz; Stigma überwiegend trüb-hyalin; Tergit 1 schwarz, mit schmalem weißem Endband; Tergit 2 schwarz, mit ⅕ gelbem Endband; folgende Tergite in der Mitte durchgehend rot, Seiten verdunkelt.

**Typen.** Holotypus: ♀, Kochelsee, Obb./D, 650-1.150 m, 12.7.85, E. Haeselbarth (ZSM).

Bayer. Alpen.

### 27. *Mesochorus intermissus*, spec. nov.

**Beschreibung** ♀: 5.1 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; mehrere Nerven in und um Areola unterbrochen; Bohrer < Tarsus III, 1, dick, bauchig; Gesicht schwarz, mit rotem Clypeus und breiten roten Orbiten; Thorax schwarz; Stigma hyalin-graubraun; Tibia-III-Ende ⅕-¼ schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅛ gelbweißem Endband; Tergit 3 schwarz, mit gelber Sanduhr-Zeichnung; folgende Tergite rot.

**Typen.** Holotypus: ♀, Messaure/S, 1.8.71, K. Müller (AEI).

Schweden.

### 28. *Mesochorus declinans* Habermehl

*Mesochorus declinans* Habermehl, 1922: 348-359, ♀ ♂.

**Diagnose.** ♀, ♂: 4.6-8.2 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren ± punktiert; Bohrer < Tarsus III, 1; Griffel < Tarsus III, 2; Gesicht gelbrot, meist gebräunt bis geschwärzt; Thorax schwarz oder schwarz + rot in unterschiedlicher Verteilung, meist Oberseite schwarz, Seiten rot; Stigma graubraun; Femur III auffällig stark verdunkelt; Tibia III ⅓ bis 1/1 geschwärzt; Tergit 1 schwarz; Tergit 2 mit schmalem, bis ⅙ breitem gelbem Endband; folgende Tergite gelbrot, mit Verdunklungen.

**Typen.** Holotypus: ♀, Neugraben, 20.6.13, Habermehl (Senck.).

Ex Diprionini und Nematini.
Fundorte in Deutschland, Tschechien, Österreich, Schweiz, N-Italien.
M-Europa mit Alpengebiet.

### 29. *Mesochorus triangulus*, spec. nov.

**Beschreibung.** ♀: 4.8-5.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren flach punktiert; Stigma verlängert; Bohrer < Tarsus III, 1, schmal; Gesicht gelbrot, mit breiten gelbweißen Orbiten; Prothorax schwarz + rot; übriger Thorax schwarz; Mesoscutum mit brauner H-Makel; Metanotum-Absturz ± rot; Stigma dunkelbraun; Tibia-III-Ende ¼-⅓ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit 1/1 rotem Mittel-Dreieck; folgende Tergite rot, schwach vespoid.

**Typen.** Holotypus: ♀, Harzburg, Radau-Tal/D, 19.8.43, E. Bauer (ZSM). – Paratypen: 4♀♀, Harz/D, E. Bauer (ZSM); 1♀, östl. Deutschland, H. Zoerner (DEI); 1♀, Polen (?) (Warschau).

Polen, Deutschland.

### 30. *Mesochorus semirufus* Holmgren

*Mesochorus semirufus* Holmgren, 1858: 125, ♀ ♂.

**Diagnose.** ♀, ♂: 4,8-6,5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren ♀ deutlich, ♂ schwach punktiert; Bohrer < (selten =) Tarsus III, 1, schmal, am Ende verjüngt; Griffel ≥ Tarsus III, 2, stabförmig; Gesicht gelbrot, meist in der Mitte gebräunt bis geschwärzt, mit breiten gelbweißen Orbiten; Thorax schwarz; Prothorax vor allem beim ♂ oft partiell rot; Mesopleuren selten partiell rot; Mesoscutum mit ± deutlicher brauner H-Zeichnung; Stigma heller oder dunkler braun; Tibia-III-Ende ♀ ¼-⅓, ♂ ⅕-¼ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ± breitem rotem Endband; ab Tergit 3 mit roter Mitte und seitlichen Verdunklungen, selten ganz rot.

**Typen.** Lectotypus: ♀, Aubert 1961, Coll. Holmgren (Stockholm).

Ex *Arge* (Psch.W.), *Eulimneria* (Hz.) (Tenthredinidae).
Fundorte in Schweden, Deutschland, Tschechien, Österreich, Schweiz, Frankreich, N-Italien.
N-, M- und W-Europa bis N-Italien.

### 31. *Mesochorus suomiensis*, spec. nov.

**Beschreibung.** ♀: 5.1 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren punktiert und gerunzelt; Bohrer < Tarsus III, 1, schmal, fast spitz; Gesicht rotbraun, mit gelbweißen Orbiten; Thorax schwarz, Stigma schwarzbraun; Tibia-III-Ende ¼-⅕ geschwärzt; Tergit 1 schwarz; Tergit 2 dto., mit sehr schmalem weißem Endrand; folgende Tergite rot.

**Typen.** Holotypus: ♀, Oshobotria bor./SF, 6.82, K. Müller (AEI).

Finnland.

### 32. *Mesochorus acutus*, spec. nov.

**Beschreibung.** ♀, ♂: 5-6.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Augenränder etwas divergierend; Mesopleuren fein punktiert; Stigma verlängert; Bohrer < Tarsus III, 1, schmal; Griffel sehr lang (Tarsus III, 2 + 3), nadelspitz; Gesicht ♀ schwarz, mit breiten gelbweißen Orbiten, ♂: gelbweiß; Thorax schwarz, ♂ mit gelbrotem Prothorax und roten (+ schwarzen) Seiten, ♀ selten mit rot + schwarzem Prothorax und Mesopleuren; Stigma hyalin-braun; Tibia-III-Ende ⅕-¼ geschwärzt; Tergit 1 schwarz; Tergit 2 dto., mit schmalem rötlichem Endrand; folgende Tergite rot, mit Verdunklungen.

**Typen.** Holotypus: ♀, Garmisch, Obb./D, Kreuzeckweg 1.400-1.600 m, E. Bauer (ZSM). – Paratypen: 1♂, Col des Mosses/CH, R. Hinz (ZSM); 8♀♀, 7♂♂, Österreich, Schweiz, Deutschland. [Haeselbarth (ZSM), Hinz (ZSM), Schwarz (Schwarz), Zoerner (DEI)].

Ex *Lartentia* (Geometridae) via *Eulimneria* (Ichneumonidae) (Hz.); ex *Eurois* (Geometridae) via *Microgaster* (Braconidae) (Hz.).
Deutschland, Österreich, Schweiz.

### 33. *Mesochorus iburganus*, spec. nov.

**Beschreibung.** ♀: 6.9 mm; Schläfe < Augenbreite; Ocellus = Vertexbrücke; Bohrer < Tarsus III, 1, kaum verjüngt; Gesicht-Mitte gebräunt; Prothorax rot, übriger Thorax schwarz; Stigma dunkelbraun; Tibia-III-Ende ¼ schwarz; Tergit 1 schwarz; Tergit 2 dto., mit 1/12 gelbweißem Endband; Tergit 3 rot, mit seitlichen Verdunklungen; folgende Tergite rot.

**Typen.** Holotypus: ♀, Iburg/D, 9.50, R. Hinz (ZSM).

Ex *Larentia* (Geometridae) via *Eulimneria* (Ichneumonidae) (Hz.).
Deutschland.

### 34. *Mesochorus mellis*, spec. nov.

**Beschreibung.** ♀: 5.4 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren relativ stark punktiert; Postpetiolus mit mehreren Furchen; Bohrer < Tarsus III, 1, schmal; Gesicht rot + schwarz, mit breiten weißen Orbiten, neben Fühlern dreieckig weiß; Prothorax rot; übriger Thorax schwarz; Mesoscutum mit großem rotem Fleck; Scutellum rot; Mesopleuren schwarz + rot; apikale Hälfte des Metanotums rot; Stigma schwarzbraun; Tibia-III-Ende ⅕ geschwärzt; Tergit 1 mit schmaler roter Endbinde; Tergit 2 schwarz, mit ¼ roter bogenförmiger Endbinde; ab Tergit 3 honigfarbig.

**Typen.** Holotypus: ♀, Hohenschwangau, Bay./D, 830-1.050 m, 16.7.74, E. Haeselbarth (ZSM).

Bayer. Alpen.

### 35. *Mesochorus skaneus*, spec. nov.

**Beschreibung.** ♀, ♂: 4.5-5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Postpetiolus mit Furchen; Bohrer < Tarsus III, 1, deutlich verjüngt; Griffel = Tarsus III, 2, am Ende etwas breiter; Gesicht gelbrot, mit helleren Orbiten; Thorax schwarz; Prothorax und Mesopleuren rot + schwarz, Mesoscutum mit brauner H-Makel; Scutellum-Seiten rot; Stigma (hyalin-)braun; Tibia-III-Ende ♀ ⅕ schwarz, ♂ ⅙ verdunkelt; Tergit 1 schwarz, mit dunkelroter Basis; Tergit 2 schwarz, mit ⅕ rotem Endrand; ♀ Tergite 3 + 4 rot, mit dunklen Seiten, danach rot; ♂ ab Tergit 3 rot.

**Typen.** Holotypus: ♀, Skåne/S, 9.69, Falle 4, Bo Svenssen (AEI). – Paratypen: 1♂, dto., Falle 3; 1♂, dto., Falle 1.

Schweden.

### 36. *Mesochorus vittator* (Zetterstedt)

*Tryphon* (*Mesoleptus*) *vittator* Zetterstedt, 1838: 387, ♂.
*Mesochorus vittator*, Holmgren 1858: 126, ♀♂.
*Mesochorus brunneus* Brischke, 1880: 184; syn. Schmiedeknecht 1910: 1988.

**Diagnose.** ♀, ♂: 4.2-6.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Hinterklauen gezähnt; Bohrer < Tarsus III, 1; Griffel > Tarsus III, 2; Gesicht rot, selten etwas gebräunt; Prothorax ♀ rot + schwarz, ♂ gelbrot; übriger Thorax schwarz; beim ♀ Mesoscutum mit ± deutlicher brauner H-Makel; Scutellum seitlich rot; beim ♂ gelbrote Mesoscutum- und Scutellum-Färbung ausgeprägt; Meso- und Metapleuren rot; Stigma heller oder dunkler braun; Tibia-III-Ende ⅕-⅙ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit schmalem gelbem Endrand; ab Tergit 3 rot, mit seitlichen Verdunklungen, diese beim ♂ ausgedehnter.

**Typen.** Verschollen.

Häufigste Art der Mesochorinae. Primärwirte vornehmlich Microlepidoptera (*Yponomeuta, Plutella, Tortrix* u.a.).
Fundorte in allen Teilen Europas.
Europa, Asien.

### 37. *Mesochorus zyganaus*, spec. nov.

**Beschreibung.** ♀, ♂: 5.5-6.1 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Bohrer < Tarsus III, 1, fast spitz; Griffel dünn, = Tarsus III, 2; Gesicht gelbrot; Prothorax ♀ rot + schwarz, ♂ schwarz; übriger Thorax schwarz; Scutellum ♀ mit roten Seiten; Stigma ♀ dunkelbraun, ♂ braun; Coxa III verdunkelt Tibia-III-Ende ¼ schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅙ gelbrotem Endrand; Tergit 3♀ rot, mit breitem schwarzbraunem Mittel-Querband, ♂ gelbrot, mit schwärzlichen Seiten; ab Tergit 4♀ rot, ♂ vespoid.

**Typen.** Holotypus: ♀, Zygana-Paß/Türkei, 26.7.73, E 393100, N 404100, R. Hinz (ZSM). – Paratypus: 1♂, dto.

Türkei.

### 38. *Mesochorus orbis*, spec. nov.

**Beschreibung.** ♀, ♂: 4-5.2 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer < Tarsus III, 1, schmal, am Ende etwas aufgebogen; Gesicht gelbrot, schwach gebräunt; Prothorax rot; Mesothorax-Oberseite schwarz, Mesopleuren rot + schwarz, Mesoscutum mit brauner H-Makel; Scutellum rot, basal schwarz; Metathorax schwarz; Stigma hyalin-braun; Tibia-III-Ende ¼ unscharf schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅕-⅙ rötlichem Endsaum, zur Mitte vorgezogen; Tergit-3-Mitte rot, Seiten schwarz; ab Tergit 4 rot, mit seitlichen Verdunklungen.

**Typen.** Holotypus: ♀, Kiruna/S, 15.7.69, R. Hinz (ZSM). – Paratypen: 10♀♀, dto.

N-Schweden.

### 39. *Mesochorus anglicus*, spec. nov.

**Beschreibung.** ♀, ♂: 4.1-6.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer < Tarsus III, 1, schmal; Griffel > Tarsus III, 2, dünn; Prothorax ♀ gelbbraun, ♂ gelbweiß; Mesothorax schwarz; Mesoscutum bei ♀ mit roter H-Makel, beim ♂ flächig rot; Scutellum-Seiten rot; Mesopleuren gelbbraun, manchmal oben schwarz gefleckt; untere Mesopleuren und Mesosternum weißlich; Beine gelbrot (♀), weiß (♂); Stigma schwarzbraun; Tibia-III-Ende ⅕-¼ schwarz; Metathorax schwarz, mit roten Seiten und rotem Metanotum-Absturz; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅛ gelbweißem Endsaum; folgende Tergite gelbbraun bis gelbweiß, seitlich verdunkelt.

**Typen.** Holotypus: ♀, Leicester/UK, 6.73, Jennifer Owen (AEI). – Paratypen: 1♂, 23♀♀, dto.

England.

### 40. *Mesochorus artus*, spec. nov.

**Beschreibung.** ♀, ♂: 4.9-6.1 mm; Schläfe extrem schmal; Ocellus > Vertexbrücke; Bohrer < Tarsus III, 1, schmal; Griffel = Tarsus III, 2; Gesicht braun bis schwarz, mit schmalen roten Orbiten; Thorax schwarz(-braun); Mesoscutum + Scutellum mit helleren Wischen; Stigma dunkler (♀) oder heller (♂) braun; Tibia-III-Ende undeutlich schmal verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz(-braun), mit ⅓-⅔ rötlicher Endaufhellung; Tergit 3 und folgende rot (♀) oder braun bis schwarz (♂).

**Typen.** Holotypus: ♀, Niedis/PL, 13 v, 21.-26.7.77, J. Sawoniewicz (Warschau). – Paratypen: 1♀, ex *Zygaena* sp. (Burgeff); 1♂, Niedzwiady/PL, leg. Ekipa, IOLID AR (Warschau); 1♂, (Kopf auf Etikett geklebt), Roßlau/D, Nr. 45/92, H. Zoerner (DEI).

Polen, Deutschland.

### 41. *Mesochorus rufoniger* Brischke

*Mesochorus rufoniger* Brischke, 1880: 185, ♀.
*Mesoschorus brevigenas* Thomson, 1885: 338, ♀ ♂; syn. Schmiedeknecht 1910: 1981.

**Diagnose.** ♀, ♂: 5.4-6.6 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren dicht fein punktiert; Petiolus mit Furchen und Runzeln; Bohrer < Tarsus III, 1, etwas bauchig; Griffel < Tarsus III, 2; Gesicht ♀ schwarz(-braun), mit weißen Orbiten, neben Fühlern dreieckig weiß, ♂ gelbrot; Thorax ♀ schwarz, mit braunen Wischen auf Mesoscutum und Scutellum, Mesopleuren schwarz + rot; Stigma dunkelbraun; Tibia-III-Ende ⅛ undeutlich schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅕ gelbrotem Endrand; folgende Tergite rot, mit schwachen Verdunklungen.

**Typen.** Verschollen. – *M. brevigena* Thomson: Lectotypus: ♀, Horstmann 1966 (UZI Lund).

Ex *Laspeyresia* (Tortricidae) (Puhl.), *Zygaena* (Zygaenidae) (Bur.), *Leucoma* (Lymantriidae) (Brischke).
Fundorte in Schweden, Rußland, Polen, Deutschland.
N-, E- und M-Europa.

### 42. *Mesochorus doleri*, spec. nov.

**Beschreibung.** ♀, ♂: 5.0-6.3 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren (fast) glatt; Postpetiolus mit Delle; Bohrer < Tarsus III, 1, stabförmig, dünn; Griffel = Tarsus III, 2; Gesicht braun(-schwarz), mit roten Orbiten, neben den Fühlern dreieckig rot; Prothorax schwarz + rot, übriger Thorax schwarz; Mesoscutum + Scutellum mit braunen Wischen, bei ♂ Mesopleuren rot + schwarz; Stigma hellbraun; Tibia-III-Ende ⅛-⅒ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅕ rotem Endband; folgende Tergite ♀ rot, ♂ Tergit 3 (+ 4) rot, danach verdunkelt.

**Typen.** Holotypus: ♀, Einbeck/D, 28.8.59, R. Hinz (ZSM). – Paratypen: 1♀, Harz/D; 1♂, Zwiesel, Bay./D; 1♂, Kassel/D – alle R. Hinz (ZSM); 2♂♂, Tomna Stas./PL, J. Sawoniewicz (Warschau).

Ex *Dolerus vertigalis* (Tenthredinidae) via *Trematopygum* (Ichneumonidae) (Hz.); ex *Loderus* sp. (Tenthredinidae) (Hz.).
M-Europa.

### 43. *Mesochorus fennicus*, spec. nov.

**Beschreibung.** ♀: 5.6 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren dicht fein punktiert; Stigma verbreitert; Tergit 1 mit 2 Längsfurchen; Bohrer < Tarsus III, 1, ziemlich breit, Ende gerundet; Kopf und Thorax schwarz, Metathorax rot; Mesoscutum mit braunen Striemen; Stigma braun; Tibia-III-Ende ⅙-⅐ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅓ rotem Endrand, dieser in der Mitte dreieckig bis ½ Tergitlänge; folgende Tergite rot, mit seitlichen Verdunklungen.

**Typen.** Holotypus: ♀, Utsjoki/SF, Nr. 190, 1986, Rinohomäki (Rinohomäki). – Paratypus: 1♀, dto, (ohne Abdomen).

Ex *Dineura virid.* (Tenthredinidae) (Rin.).
Finnland.

### 44. *Mesochorus moskwanus*, spec. nov.

**Beschreibung.** ♀: 4.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mespleuren dicht flach punktiert; Bohrer < Tarsus III, 1, schmal, fast spitz; Gesicht gelbweiß; Prothorax sowie Seiten von Meso- und Metathorax rot; Mesoscutum mit rotem H-Fleck; Scutellum überwiegend rot; Stigma schwarzbraun; Coxae und Beine weiß; Tibia-III-Ende ⅙ schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ¼ gelbem Endrand; folgende Tergite rot, mit schwachen seitlichen Verdunklungen.

**Typen.** Holotypus: ♀, Moskau/USSR, 9.8.68, H. & M. Townes (AEI).

Rußland.

### 45. *Mesochorus testaceus* Gravenhorst

*Mesochorus testaceus* Gravenhorst, 1829: 1973, ♂.
*Mesochorus testaceus* Holmgren, 1858: 128, ♀ ♂. **(?????)**

**Diagnose.** ♀, ♂: 6-8 mm; Schläfe ≥ Augenbreite; Ocellus < Vertexbrücke; unterer Mandibelzahn > oberer; Mesopleuren stark punktiert; Bohrer < Tarsus III, 1, stabförmig; Griffel ≥ Tarsus III, 2, dünn; Gesicht gelbrot; Thorax ♀ rot, mit schwarzem Mesonotum und Metathorax, Mesoscutum mit rotem H-Fleck; Scutellum partiell rot, selten schwarz; selten Prothorax und Mesopleuren (partiell) schwarz; ♂ Thorax ganz rot, mit braunen Flecken oberseits; Stigma braun; Tibia-III-Ende schmal undeutlich verdunkelt; Tergit 1 schwarz, selten schwarz + rot; Tergit 2 schwarz, mit ⅕-⅐ gelbrotem Endrand; folgende Tergite rot, mit seitlichen Verdunklungen.

**Typen.** Verschollen.

Ex *Seytropia* (Yponomeutidae) (Jä.); ex *Olethreutes* (Tortricidae) via *Apanteles* (Braconidae) (Schw.).
Fundorte in Finnland und Schweden bis N-Frankreich und Tschechien.
N- und M-Europa.

### 46. *Mesochorus schwarzi*, spec. nov.

**Beschreibung.** ♂: 4 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren dicht fein punktiert; Griffel > Tarsus III, 2; Gesicht über Clypeus stark verdunkelt; Prothorax schwarz + rot; übriger Thorax schwarz; Stigma hyalin; Tibia-III-Ende schmal undeutlich verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit 1/16 weißem Endrand; Tergit 3 schmal gelbweiß, ⅚ schwarz, ⅙ rot; folgende Tergite rot, mit Verdunklungen.

**Typen.** Holotypus: ♂, Zellreit b. Krispl, Salzburg/A, 29.7.88, M. Schwarz (Schwarz).

Salzburger Alpen.

### 47. *Mesochorus minutulus*, spec. nov.

**Beschreibung.** ♂: 2.4 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Stigma verbreitert; Postpetiolus mit Gruben und Runzeln; Griffel > Tarsus III, 2, zum Ende verbreitert; Gesicht gelbrot; Prothorax rot, übriger Thorax schwarz; Mesopleuren mit roten Flecken; Stigma braun; Tibia-III-Ende ⅙ undeutlich verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz mit ⅒ weißem Endrand; Tergit 3 rotbraun, basal ⅛ gelbweiß, mit ¼ gelbweißer Zunge; folgende Tergite hellrot, mit dunkelroten Verdunklungen.

**Typen.** Holotypus: ♂, Werneck/D, 29.9.66, K. Horstmann (Horstmann).

Deutschland.

## Gruppe 7.6. *pectoralis*

**Diagnose.** Abdomen: Dunkel-Hell-Dunkel (DHD). Tergit 1 schwarz(-braun); Abdomen-Mitte = Tergite (2 +) 3 (+ 4) hell (gelb, rot, hellbraun); folgende Tergite dunkel (schwarz, grau, dunkelbraun) oder hell/dunkel gebändert (vespoid).

### Bestimmungstabelle der Arten (♀♀)

1(44) Stigma (überwiegend) hyalin, gelb oder weiß

2(29) Bohrer ≥ Tarsus III, 1

3(12) Tibia-III-Ende breit (min. ⅙) verdunkelt

4(9) Bohrer > Tarsus III, 1

5(6) Gesicht rot ........ 1. *virgatus*, spec. nov. (S. 99)

6(5) Gesicht schwarz

7(8) Länge 6 mm; Bohrer-Ende aufgebogen ........ 2. *alternus*, spec. nov. (S. 99)

8(7) Länge 3 mm; Bohrer gerade ........ 3. *rapae*, spec. nov. (S. 99)

9(4) Bohrer = Tarsus III, 1

10(11) Tergit-1-Basis schwarz ........ 4. *septentrionalis*, spec. nov. (S. 99)

11(10) Tergit-1-Basis rot ........ 5. *provocator* Aubert (S. 100)

12(3) Tibia-III-Ende schmal (max. ⅐) verdunkelt

13(18) Bohrer > Tarsus III, 1

14(15) Tergit-2-Ende 1/12 weißgelb ........ 6. *bucculentus*, spec. nov. (S. 100)

15(14) Tergit-2-Ende ⅓-⅙ rot

16(17) Gesicht hell ........ 7. *tenebricosus*, spec. nov. (S. 100)

17(16) [Gesicht verdunkelt (Exemplar mit gebänd. Abdomen-Hinterhälfte) *clarus*, spec. nov.] (S. 84)

18(13) Bohrer = Tarsus III, 1

19(20) Stigma weiß, schillernd ........ 8. *versicolor*, spec. nov. (S. 100)

20(19) Stigma hyalin oder gelb

21(24) Mesopleuren ganz oder teilweise rot

22(23) Mesopleuren rot … 9. *extremus*, spec. nov. (S. 101)

23(22) Mesopleuren rot + schwarz … 10. *bicolor*, spec. nov. (S. 101)

24(21) Mesopleuren schwarz

25(26) Tergit-2-Ende ⅓ rot … 11. *morenator*, spec. nov. (S. 101)

26(25) Tergit-2-Ende ⅛-⅒ gelblich

27(28) Mesopleuren (fast) glatt … 12. *norrbyneus*, spec. nov. (S. 101)

28(27) Mesopleuren stark punktiert … 13. *boreus*, spec. nov. (S. 102)

29(2) Bohrer < Tarsus III, 1

30(37) Tibia-III-Ende breit (min. ⅙) verdunkelt

31(32) Tibia-III-Ende ⅓ schwarz … 14. *sardegnae*, spec. nov. (S. 102)

32(31) Tibia-III-Ende ⅙ schwarz

33(36) Tergit-2-Ende ½ weiß

34(35) Schläfe < Augenbreite … 15. *tenuiscapus*, spec. nov. (S. 102)

35(34) Schläfe > Augenbreite … 16. *myrtilli*, spec. nov. (S. 102)

36(33) Tergit-2-Ende ¼ rot … 17. *tarnabyanus*, spec. nov. (S. 102)

37(30) Tibia-III-Ende schmal (max. ⅐) verdunkelt oder hell

38(41) Tibia-III-Ende hell oder max. ⅒ verdunkelt

39(40) Ocellus < Vertexbrücke … 18. *subfuscus*, spec. nov. (S. 103)

40(39) Ocellus > Vertexbrücke … 19. *luridipes*, spec. nov. (S. 103)

41(38) Tibia-III-Ende ⅐-⅛ geschwärzt

42(43) Coxa III verdunkelt … 20. *riparius*, spec. nov. (S. 103)

43(42) Coxa III hell … 21. *nitidus* , spec. nov. (S. 103)

44(1) Stigma (heller oder dunkler) braun

45(108) Bohrer ≥ Tarsus III, 1

46(93) Tibia-III-Ende breit (min. ⅙) verdunkelt

47(54) Schläfe ≥ Augenbreite

48(49) Schläfe > Augenbreite … 22. *superbus*, spec. nov. (S. 104)

49(48) Schläfe = Augenbreite

50(51) Stigma schwarzbraun … 23. *arduus*, spec. nov. (S. 104)

51(50) Stigma heller braun

52(53) Mesopleuren glatt … 24. *bellus*, spec. nov. (S. 104)

53(52) Mesopleuren stark punktiert … 25. *sufflatus*, spec. nov. (S. 104)

54(47) Schläfe < Augenbreite

55(62) Mesopleuren schwarz(-braun) + rot

56(57) Tergit-2-Ende 1/10 weiß ........ 26. *lunarius*, spec. nov. (S. 105)

57(56) Tergit-2-Ende 1/4-1/1 rot

58(59) Tergit-2-Ende mit 1/1 rotem Dreieck ........ 27. *messaureus*, spec. nov. (S. 105)

59(58) Tergit-2-Ende 1/4-1/3 rot

60(61) Tergit-2-Endband 1/4 rot ........ 28. *venerandus*, spec. nov. (S. 105)

61(60) Tergit-2-Endband 1/3 rot ........ 29. *dilobatus*, spec. nov. (S. 105)

62(55) Mesopleuren schwarz

63(64) Mesosternum rot ........ 30. *sternalis*, spec. nov. (S. 106)

64(63) Mesosternum schwarz

65(76) Tergit-2-Endband 1/10-1/12 weiß

66(67) Gesicht gelbrot ........ 31. *pumilionis*, spec. nov. (S. 106)

67(66) Gesicht gebräunt oder geschwärzt

68(69) Gesicht gebräunt ........ 32. *bracatus*, spec. nov. (S. 106)

69(68) Gesicht geschwärzt

70(71) Bohrer fast spitz ........ 33. *olitorius*, spec. nov. (S. 106)

71(70) Bohrer-Ende stumpf

72(73) Stigma hyalin-braungrau ........ 34. *hortensis*, spec. nov. (S. 106)

73(72) Stigma schwarzbraun

74(75) Gesichtsmitte mit erhöhtem Kiel ........ 35. *carinatus*, spec. nov. (S. 107)

75(74) Gesichtsmitte ohne Kiel ........ 36. *insularis*, spec. nov. (S. 107)

76(65) Tergit-2-Endband 1/4-1/7 rot

77(84) Tergit-2-Endband 1/4-1/5 rot

78(79) Gesicht gebräunt ........ 37. *martinus*, spec. nov. (S. 107)

79(78) Gesicht geschwärzt

80(81) Stigma hellbraun ........ 38. *aranealis*, spec. nov. (S. 107)

81(80) Stigma schwarzbraun

82(83) Länge 4.5 mm; Bohrer schmal, schwarz ........ 39. *iniquus*, spec. nov. (S. 108)

83(82) Länge 6.5 mm; Bohrer breit, rot ........ 40. *canaveseus*, spec. nov. (S. 108)

84(77) Tergit-2-Endband 1/6-1/7 rot

85(88) Mesopleuren stark punktiert

86(87) Tibia-III-Ende 1/3 schwarz ........ 41. *cacuminis*, spec. nov. (S. 108)

87(86) Tibia-III-Ende 1/4 verdunkelt ........ 42. *gladiator*, spec. nov. (S. 108)

88(85) Mesopleuren (fast) glatt

89(90) Neben Fühlern dreieckig weiß ........ 43. *gemellus*, spec. nov. (S. 108)

90(89) Neben Fühlern anders gefärbt

91(92) Coxa III schwarz ........ 44. *piemontensis*, spec. nov. (S. 109)

92(91) Coxa III rot ... 45. *ovimaculatus*, spec. nov. (S. 109)

93(46) Tibia-III-Ende schmal (max. 1/7) dunkel

95(105) Mesopleuren schwarz

95(98) Gesicht (z.T.) schwarz

96(97) Bohrer gerade ... 46. *pullus*, spec. nov. (S. 109)

97(96) Bohrer gebogen ... 47. *terebratus*, spec. nov. (S. 109)

98(95) Gesicht hell oder gebräunt

99(102) Stigma hyalin-braun

100(101) Länge 4.5 mm; Klauen gekämmt ... 48. *pectinipes* Bridgman (S. 110)

101(100) 4 mm; Klauen ungekämmt ... 49. *amnicolaris*, spec. nov. (S. 110)

102(99) Stigma schwarzbraun

103(104) Coxa III rot ... 50. *mülleri*, spec. nov. (S. 110)

104(103) Coxa III geschwärzt ... 51. *horstmanni*, spec. (S. 111)

105(94) Mesopleuren rot + schwarz

106(107) Schläfe > Augenbreite ... 52. *inflatus*, spec. nov. (S. 111)

107(106) Schläfe < Augenbreite ... 53. *meridionator* Aubert (S. 111)

108(45) Bohrer < Tarsus III, 1

109(126) Tibia-III-Ende breit (min. 1/6) dunkel

110(117) Schläfe ≥ Augenbreite

111(112) Schläfe > Augenbreite ... 54. *pascuus*, spec. nov. (S. 111)

112(111) Schläfe = Augenbreite

113(114) Tergit-2-Endrand 1/5 rot ... 55. *zwettleus*, spec. nov. (S. 112)

114(113) Tergit-2-Endrand ca. 1/12 weiß

115(116) Abdomen-Hinterhälfte schwarz ... 56. *chasseralis*, spec. nov. (S. 112)

116(115) Abdomen-Hinterhälfte gebändert ... 57. *oxfordensis*, spec. nov. (S. 112)

117(110) Schläfe < Augenbreite

118(119) Tergit 2 mit 1/2 gelbweißem Dreieck ... 58. *pyramideus*, spec. nov. (S. 112)

119(118) Tergit 2 mit 1/4-1/12 hellem Endband

120(121) Tergit 2 mit 1/10-1/12 weißem Endband ... 59. *solus*, spec. nov. (S. 112)

121(120) Tergit 2 mit 1/4-1/7 gelbrotem Endband

122(123) Mesopleuren rot ... 60. *tenuigenae*, spec. nov. (S. 113)

123(122) Mesopleuren schwarz

124(125) Neben Fühlern weißes Dreieck ... 61. *pectoralis* Ratzeburg (S. 113)

125(124) Neben Fühlern anders gefärbt ... 62. *diluvius*, spec. nov. (S. 113)

126(109) Tibia-III-Ende schmal (max. 1/7) dunkel ... 63. *versuranus*, spec. (S. 113)

### 1. *Mesochorus virgatus*, spec. nov.

**Beschreibung.** ♀: 3.2 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren schütter punktiert; Stigma verbreitert; Bohrer sehr lang (Tarsus III, 1 + 2), schmal, stark verjüngt; Gesicht gelblich, mit 3 braunen Flecken, neben Fühlern dreieckig weiß; Thorax-Oberseite braun; Mesoscutum mit hellerer H-Makel; Thorax-Seiten gelbrot; Stigma trüb-hyalin; Tibia-III-Ende ¼-⅕ schwarz; Tergit 1 schwarzbraun; Tergit 2 braun, mit ¼ rotem Endband; folgende Tergite rotbraun gebändert.

**Typen.** Holotypus: ♀, Dessau/D, 4 km SSE, 18.6.88, Nr. 12/88, Mulde-Auenwald, H. Zoerner (DEI).

Östl. Deutschland.

### 2. *Mesochorus alternus*, spec. nov.

**Beschreibung.** ♀: 7 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren flach punktiert; Nervulus postfurkal; Bohrer < Tarsus III, 1, breit stabförmig; Gesicht geschwärzt, mit breiten gelbroten Orbiten; Thorax schwarz; Stigma hyalin, mit Gelbstich; Tibia-III-Ende ⅕ schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅛ weißlichem Endband; Tergit 3 dreifarbig: ½ bogenförmiger roter Basalsaum, braunschwarzes und braunes Band; Tergit 4 dunkel-hellbraun gebändert; ab Tergit 5 schwarz.

**Typen.** Holotypus: ♀, Umgebung Linz/A, 19.5.27, H. Priesner (ZSM).

Österreich.

### 3. *Mesochorus rapae*, spec. nov.

**Beschreibung.** ♀, ♂: 3 mm; Schläfe ♀ <, ♂ = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren schütter punktiert; Bohrer = Tarsus III, 1, relativ breit; Griffel = Tarsus III, 2, dünn; Gesicht stark gebräunt, mit schmalen (♀), breiteren (♂) gelbroten Orbiten; Thorax schwarz; Mesoscutum mit ± deutlicher brauner H-Makel; Stigma trüb-hyalin; Coxa III gebräunt; Tibia-III-Ende ¼-⅓ schwarz; Tergit 1 schwarz; Tergit 2 dto., mit ⅙-⅛ gelbrotem Endsaum; Tergit 3 längs der Mitte rot, seitlich schwarz; folgende Tergite schwarz(-braun).

**Typen.** Holotypus: ♀, Warszawa/PL, 9.8.71, T. Plenica (Warschau). – Paratypen: 2♂♂, Messaure/S; K. Müller (AEI).

Ex *Pieris* via *Apanteles* (Plen.).
Schweden, Polen.

### 4. *Mesochorus septentrionalis*, spec. nov.

**Beschreibung.** ♀: 4.1 mm; Schläfe = Wangenbreite; Ocellus < Vertexbrücke; Mesopleuren schütter punktiert; Stigma verkleinert; Postpetiolus mit Furche und Rillen; Bohrer = Tarsus III, 1, am Ende etwas aufgebogen; Gesicht gebräunt; Thorax schwarz; Mesoscutum mit schwacher brauner H-Makel; Scutellum mit braunen Seiten; Stigma hyalin; Coxa III schwach verdunkelt; Tibia-III-Ende ¼ geschwärzt; Tergit 1 schwarz, mit dunkelroter Basis; Tergit 2 schwarz, mit schmalem hellen Endrand; folgende Tergite rot, mit braunen Bändern (selten in der Mitte durchgehend rot (s. Schlüssel DHH).

**Typen.** Holotypus: ♀, Kiruna/S, 3.8.68, R. Hinz (ZSM). – Paratypen: 1♀, dto.; 1♀, Abisko/S, R. Hinz (ZSM); 1♀, Thorsarver/Isl., Falle B 21, E. Olavsson (AEI).

Island, N-Schweden.

### 5. *Mesochorus provocator* Aubert

*Mesochorus provocator* Aubert, 1965: 21, ♀ ♂.

**Diagnose.** ♀, ♂: 3.5-4.6 mm; Schläfe < Augenbreite; Ocellus > (♀), ≤ (♂) Vertexbrücke; Postpetiolus mit Längsrillen; Bohrer = Tarsus III, 1, stabförmig; Griffel > Tarsus III, 2, am Ende verbreitert; Gesicht gebräunt bis geschwärzt; Thorax schwarz, mit brauner H-Makel und braunen Scutellum-Seiten; Prothorax und Mesopleuren partiell rot; Stigma hyalin; Coxa III gebräunt; Tibia-III-Ende ⅐ geschwärzt; Tergit 1 schwarz, mit roter Basis; Tergit 2 schwarz, mit ⅓ gelbrotem Endband; Tergit 3 basale Hälfte gelbrot, apikale schwarz, selten rotgelb; folgende Tergite rot, mit dunklen Bändern oder ganz dunkel.

**Typen.** Holotypus ♀, Bernay (Eure) (F., 7.54), J. F. Aubert (Aubert).

Ex *Porthesia* (Lymantriidae) (Aubert); ex *Ephyra* (Geometridae) via *Apanteles* (Cap.); ex Geometridae an Kiefer via *Apanteles* (Schw.).
M-Europa.

### 6. *Mesochorus bucculentus*, spec. nov.

**Beschreibung.** ♀: 6.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren dicht punktiert; Stigma schmal; Bohrer > Tarsus III, 1; Gesicht gelbrot, mit breiten weißen Orbiten, neben Fühlern dreieckig weiß; Stigma überwiegend hyalin; Prothorax schwarz + rot, übriger Thorax schwarz; Coxa III verdunkelt; Tibia-III-Ende schmal undeutlich verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit 1/12 weißem Endrand; ab Tergit 3 rot/dunkelbraun gebändert.

**Typen.** Holotypus: ♀, Nichelino, TO/I, Stupinigi, 9.-14.5.88, A. Scaramozzino (Scaramozzino); nach der Beschreibung Abdomen verloren.

N-Italien.

### 7. *Mesochorus tenebricosus*, spec. nov.

**Beschreibung.** ♀: 4.6-5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Bohrer < Tarsus III, 1, schmal, zum Ende stark verjüngt; Gesicht rot; Thorax schwarz; Stigma hyalin; Tibia-III-Ende ⅙ unscharf verdunkelt; Tergit 1 schwarz, Tergit 2 schwarz, mit ¼ gelbrotem Endsaum; Tergit-3-Mitte rot, Seiten schwärzlich; folgende Tergite schwarz.

**Typen.** Holotypus: ♀, Col. d'Ornon/F, E 055900, N 450200, 10.7.75, R. Hinz (ZSM). – Paratypen: 1♀, Les Deux Alpes/F, 1♀, Kandersteg/CH, R. Hinz (ZSM).

Französ. und Schweizer Alpen.

### 8. *Mesochorus versicolor*, spec. nov.

**Beschreibung.** ♀, ♂: 3.6-5.0 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren fein punktiert; Bohrer = Tarsus III, 1, relativ breit, am Ende etwas aufgebogen; Griffel = Tarsus III, 2, dünn, nadelspitz; Gesicht ♀ rotgelb, mit weißen Orbiten, ♂ gelbweiß; Thorax ♀ rot, mit braunen Wischen auf Mesoscutum, Scutellum und Mesopleuren; ♂ Prothorax gelbweiß, übriger Thorax braunrot; Mesoscutum mit gelbroter H-Makel; Scutellum rot; Stigma hyalin, weiß schillernd; Tibia-III-Ende schmal undeutlich verdunkelt; Tergit 1 braunschwarz, mit roter Basis; Tergit 2 schwarzbraun, mit schmalem weißem Endsaum; Tergit 3♀ rotbraun, ♂ weiß, mit braunen Seiten; Tergit 4 basal ⅛ weiß, danach ⅞ rotbraun; folgende Tergite rotbraun, mit feinen weißen Grenzsäumen.

**Typen.** Holotypus: ♀, Skåne/S, Falle 4, Bo Svensson, 7.69 (AEI). – Paratypus: 1♂, Polen, Nr. 916 (Warschau).

S-Schweden, Polen.

### 9. *Mesochorus extremus*, spec. nov.

**Beschreibung.** ♀: 3.8 mm; Schläfe extrem schmal; Ocellus > Vertexbrücke; Gesicht quadratisch; Stigma verbreitert; Postpetiolus mit Rillen; Bohrer = Tarsus III, 1, schmal; Gesicht rot, mit Verdunklungen; Prothorax rot, übriger Thorax schwarz; Mesoscutum mit flächiger gelber Zeichnung; Scutellum überwiegend rot; Mesopleuren oben etwas rot; Stigma trüb-hyalin; Coxa III gebräunt; Tibia III weiß, am Ende $1/7$ schwarz; Tergit 1 schwarz, mit dunkelroter Basis; ab Tergit 4 dunkel/hell gebändert.

**Typen.** Holotypus: ♀, Polen, Nr. 927 (Warschau).

Polen.

### 10. *Mesochorus bicolor*, spec. nov.

**Beschreibung.** ♀, ♂: 4.0-6.9 mm; Schläfe < Augenbreite; Ocellus £ Vertexbrücke; Postpetiolus mit Delle; Bohrer = Tarsus III, 1, relativ breit; Griffel = Tarsus III, schlank, stabförmig; Gesicht ♀ schwarz, ♂ gebräunt, mit hellen Orbiten; Prothorax ♀ rot + braun, ♂ gelbbraun; Mesothorax ♀ braun, mit gelblicher H-Makel auf Mesoscutum, roten Scutellum-Seiten und zweifarbigen Mesopleuren: oben rot, unten schwarz; Mesothorax ♂ ganz rot; Metathorax ♀ schwarz, ♂ oben (rot +) braun, seitlich rot; Stigma hyalin; Tibia-III-Ende $1/8$-$1/10$ verdunkelt; Abdomen schwarz; Tergit-2-Ende mit $1/8$-$1/12$ gelbweißem Endrand; Tergit 3 rot, mit seitlichen Verdunklungen (selten auch Tergite 4 + 5 rot); ab Tergit 4 schwarz/braun gebändert.

**Typen.** Holotypus: ♀, Gröbenzell, Bay./D, 6.7.78, W. Schwenke (ZSM). – Paratypen: 12♀♀, (Ryrholm/S, Hinz/D, Schwenke/D, Zoerner/D, Schwarz/A) und 10♂♂, (Schwenke/D, Ryrholm/S, Hinz/D, Haeselbarth/D; (Haeselbarth, Hinz, Schwenke: ZSM).

Ex *Operophthera* (Geometridae) via *Apanteles* (Braconidae) (Hz.); ex *Leucoma* (Lymantriidae) (Ryr.).
N- und M-Europa.

### 11. *Mesochorus morenator*, spec. nov.

**Beschreibung.** ♀: 4.5 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Stigma vergrößert; Mesopleuren stark punktiert; Bohrer = Tarsus III, 1; Gesicht gebräunt, mit gelbroten Orbiten, neben Fühlern dreieckig weiß; Thorax schwarz; Mesoscutum mit braunem H-Fleck; Scutellum-Seiten rot; Stigma schmutzig-hyalin; Tibia-III-Ende schmal verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit $1/3$ rotem Endsaum; folgende Tergite rot/braun gebändert.

**Typen.** Holotypus: ♀, El-Soldado, Sierra Morena/E, 21.5.26, Seyrig (Paris). Kopf gesondert geklebt.

Iberische Halbinsel.

### 12. *Mesochorus norrbyneus*, spec. nov.

**Beschreibung.** ♀: 3.5 mm; Schläfe schmal; Ocellus < Vertexbrücke; Stigma schmal; Petiolus mit 3 Furchen; Tergit 2 basal mit Grube; Bohrer = Tarsus III, 1; Gesicht stark gebräunt; Stigma hyalin; Tibia-III-Ende schmal verdunkelt; Thorax schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit $1/16$ weißem Endband; Tergit 3 rotbraun, seitlich verdunkelt; ab Tergit 4 vespoid.

**Typen.** Holotypus: ♀, Norrbyn/S, 20.9.80, K. Müller (AEI)

Schweden.

### 13. *Mesochorus boreus*, spec. nov.

**Beschreibung.** ♀: 4.8 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Bohrer = Tarsus III, 1, schmal, zum Ende verdünnt; Gesicht schwach verdunkelt; Thorax schwarz, mit roter H-Makel auf Mesoscutum und roten Scutellum-Seiten; Stigma hyalin; Tibia-III-Ende sehr schmal verdunkelt; Abdomen schwarz; Tergit-2-Ende ca. ⅛ gelblich; Tergit 3 mit rotgelber Mittellasche bis ⅔; ab Tergit 4 dunkler-vespoid.

**Typen.** Holotypus: ♀, Kvikkiokk/S, 1.7.64, R. Hinz (ZSM).

Schweden.

### 14. *Mesochorus sardegnae*, spec. nov.

**Beschreibung.** ♀: 4.5 mm; Schläfe sehr schmal; Ocellus > Vertexbrücke; Stigma lang und schmal; Bohrer < Tarsus III, 1, dick; Gesicht schwarz, mit gelbweißen Orbiten, die, sich verschmälernd, in Fühlerhöhe enden; Thorax rot; Mesoscutum mit brauner H-Makel; Stigma überwiegend hyalin; Tibia-III-Ende ¼-⅓ schwarz; Tergit 1 schwarz; Tergite 2 + 3 dunkelrot; ab Tergit 4 schwarz.

**Typen.** Holotypus: ♀, Sardegna/I, Rio Piscinas, Marina di Arbus (CA), 25.5.82, A. Scaramozzino (Scaramozzino).

Italien.

### 15. *Mesochorus tenuiscapus* Thomson

*Mesochorus tenuiscapus* Thomson, 1885: 341, ♀ ♂.

**Diagnose.** ♀, ♂: 4,2 – 5,7 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren dicht punktiert; Bohrer < Tarsus III, 1; Griffel = Tarsus III, 2, nadelspitz; Gesicht rot; Prothorax rotgelb; übriger Thorax schwarz; Mesoscutum mit brauner H-Makel; Scutellum-Seiten rot; Mesopleuren rot + braun; Stigma hyalin; Tibia-III-Ende ⅙ schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅙-⅛ rotem Endrand; Tergit 3 rot, seitlich geschwärzt; folgende Tergite schwarz.

**Typen.** Lectotypus: ♀, Schwenke 1968 (UZI Lund).

Ex *Taeniocampa* (Noctuidae) via Braconidae (Hz.); ex *Larentia* (Geometridae) via Braconidae (Hz.).
Zahlreiche Fundorte in Schweden,Deutschland, Österreich und N-Italien.
N- und M-Europa.

### 16. *Mesochorus myrtilli*, spec. nov.

**Beschreibung.** ♀: 4.2 mm; Schläfe > Augenbreite; Ocellus < Vertexbrücke; Stigma klein und schmal; Bohrer < Tarsus III, 1, am Ende kaum verjüngt; Gesicht schwarz, mit schmalen roten Orbiten; Thorax schwarz; Stigma größtenteils hyalin; Coxa III verdunkelt; Tibia-III-Ende ⅕ geschwärzt; Abdomen schwarz; Tergit 2 mit schmalem weißem Endsaum; Tergit 3 längs der Mitte gelbrot, Seiten schwarzbraun; folgende Tergite schwarzbraun, mit schmalen apikalen Aufhellungen.

**Typen.** Holotypus: ♀, Reither-Alm/D, 850 m, 26.5.71, an Heidelbeeren, E. Haeselbarth (ZSM).

Dt. Alpen.

### 17. *Mesochorus tarnabyanus*, spec. nov.

**Beschreibung.** ♀: 4.3 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren grob punktiert; Nervulus praefurkal; Postpetiolus mit feinen Rillen; Bohrer < Tarsus III, 1, schmal; Gesicht leicht

gebräunt; Prothorax rot; übriger Thorax schwarz; Mesoscutum mit angedeuteter brauner H-Makel; Scutellum-Seiten braun; Stigma hyalin; Tibia-III-Ende $\frac{1}{6}$ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit $\frac{1}{4}$ gelbweißem Endsaum; Tergit 3 rot, mit verdunkelten Seiten; folgende Tergite schwarzbraun.

**Typen.** Holotypus: ♀, Tarnaby/S, 21.7.69, R. Hinz (ZSM).

Schweden.

### 18. *Mesochorus subfuscus*, spec. nov.

**Beschreibung.** ♀, ♂: 3.6-5.8 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren fein punktiert; Bohrer < Tarsus III, 1, am Ende etwas aufgebogen; Griffel = Tarsus III, 2, mit großen Basalkörpern (Abb. 2C); Gesicht schwach gebräunt; ganzer Körper rot und hellbraun; dunkelbraune Teile: Schulterstreifen; Tergit 1, außer hellroter Basis; bei Exemplar aus Schweden und Thüringen auch Metanotum, aus Thüringen auch Mesopleuren partiell dunkelbraun; Tergit 2 dunkelbraun, außer schmalem hellerem Endband; ab Tergit 3 dunkelbraun/hellbraun, vespoid.

**Typen.** Holotypus: ♀, Kelchsau/A, 1.850 m, 22.7.71, E. Haeselbarth (ZSM). – Paratypen: 3♀♀, Haeselbarth, Österr. Alpen + Dt. Alpen; 1♂, Scaramozzino, Ital. Alpen; 2♂♂, Österr. Alpen, Schwarz, Hartig; 1♂, Thüring. Wald/D, Zoerner; (Haeselbarth, Hartig: ZSM; H. Zoerner: DEI)).

Ex *Lygris* (Geometridae) via *Rogas* (Braconidae) (Haes.); ex Geometridae-Raupe an *Vaccinium myrtillus* (Geometridae) (Haes.).
M-Europa, montan und alpin.

### 19. *Mesochorus luridipes*, spec. nov.

**Beschreibung.** ♀: 6.0 mm; Schläfe < Augenbreite; Ocellus > Vertexbrücke; Bohrer < Tarsus III, 1, breit, gerade, zum Ende kaum verjüngt; Gesicht rotbraun, mit breiten rotgelben Orbiten; Prothorax gelb; Mesothorax gelbrot; Mesoscutum mit braunen Wischen; Scutellum partiell braun; Mesopleuren basal $\frac{2}{3}$ braun; Metathorax schwarz; Beine weiß; Tibia-III-Ende schmal schwach verdunkelt; Abdomen schwarz; Tergit 2 mit $\frac{1}{12}$ weißem Endband; Tergit 3 längs der Mitte gelbrot, Seiten braun; Tergit 4 braun, mit von der Basis-Mitte ausgehender breiter gelber Zunge bis Segment-Mitte; folgende Tergite braun.

**Typen.** Holotypus: ♀, Skåne/S, 8.69, Falle 1, Bo Svensson (AEI).

Schweden.

### 20. *Mesochorus riparius*, spec. nov.

**Beschreibung.** ♀: 4.1 mm; Schläfe sehr schmal; Ocellus > Vertexbrücke; Mesopleuren stark punktiert; Tergit 1 mit langer Mittelfurche; Bohrer < Tarsus III, 1, schmal; Gesicht geschwärzt, mit roten Orbiten; Thorax schwarz; Stigma hyalin; Coxa III stark gebräunt; Tibia-III-Ende ca. $\frac{1}{10}$ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit $\frac{1}{6}$ gelbweißem Endband; Tergit 3 basale Hälfte gelbrot, apikale Hälfte schwarz; folgende Tergite schwarz.

**Typen.** Holotypus: ♀, Dessau/D, 4 km SSW, 19.9.85, Nr. 267/85, Taube-Ufer, H. Zoerner (DEI).

Deutschland.

### 21. *Mesochorus nitidus*, spec. nov.

**Beschreibung.** ♀: 4 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Bohrer < Tarsus III, 1, breit, am Ende etwas aufgebogen; Gesicht schwarz, mit roten Orbiten; Thorax schwarz; Stigma überwiegend

hyalin; Coxa III und Femur III gebräunt; Tibia-III-Ende ⅙ verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅐ gelbem Endrand; Tergit 3 rot, Seiten verdunkelt; folgende Tergite braun/rot gebändert.

**Typen.** Holotypus: ♀, Grünten b. Sonthofen, Obb./D, 1.450-1.600 m, 15.8.83, E. Haeselbarth (ZSM).

Bayer. Alpen.

### 22. *Mesochorus superbus*, spec. nov.

**Beschreibung.** ♀, ♂: 5.0-6.5 mm; Schläfe viel > Augenbreite; Ocellen extrem klein; Gesicht stark aufgebläht; Mesopleuren dicht und tief punktiert; Bohrer = Tarsus III, 1, stabförmig; Griffel = Tarsus III, 2; Gesicht ♀ schwarz, mit breiten roten Orbiten, ♂ gelbrot; Thorax ♀ schwarz, mit braunen Wischen auf Mesoscutum und Scutellum; ♂ Prothorax rot, Mesopleuren rot + schwarz, Mesoscutum mit flächiger rotgelber H-Makel; Scutellum-Seiten rot; Stigma hyalin-braun; Coxa III oben stark gebräunt; Tibia-III-Ende ¼ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅛ (♀), ⅙ (♂) gelbrotem Endsaum; Tergit 3 rot, beim ♂ mit Verdunklungen; folgende Tergite schwarzbraun.

**Typen.** Holotypus: ♀, Fischen, Allgäu/D, 25.8.80, W. Schwenke (ZSM). – Paratypen: 2♂♂, Tirol/A, E. Haeselbarth (ZSM); 1♂, Harz/D, E. Bauer (ZSM); 1♂, Dessau/D, H. Zoerner (DEI).

M-Europa.

### 23. *Mesochorus arduus*, spec. nov.

**Beschreibung.** ♀, ♂: 4.8-5.2 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Metanotum-Absturz auffallend steil; Area post. auffallend groß; Bohrer viel > Tarsus III, 1, etwas nach unten gebogen; Griffel = Tarsus III, 2, dünn, etwas nach oben gebogen; Gesichtsmitte geschwärzt (♀) oder gebräunt (♂), mit weißgelben Orbiten, neben Fühlern dreieckig weiß; Thorax schwarz; Mesoscutum mit schwacher brauner H-Makel; Stigma schwarzbraun; Coxa III oben geschwärzt; Tibia-III-Ende ⅙ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit sehr schmalem weißgelbem Endsaum; Tergit 3 rotgelb, seitlich verdunkelt; ab Tergit 4 braun/gelb gebändert.

**Typen.** Holotypus: ♀, Skåne/S, 6.69, Falle 2, B. Svensson (AEI). – Paratypen: 3♂♂, dto.

Schweden.

### 24. *Mesochorus bellus*, spec. nov.

**Beschreibung.** ♀, ♂: 3.5-3.6 mm; Schläfe ≥ Augenbreite; Ocellus < Vertexbrücke; Abdomen ♀ fast spitzeiförmig; Bohrer = Tarsus III, 1, stabförmig dünn; Griffel < Tarsus III, 2, relativ klobig; Gesicht gelbrot, leicht verdunkelt; Thorax schwarz; Stigma hyalin-bräunlich; Coxa III stark verdunkelt; Tibia-III-Ende ⅕ schwarz; Abdomen schwarz; Tergit 2 mit ca. 1/12 weißem Endsaum; Tergit 3 mit schmalem gelbem Basalsaum.

**Typen.** Holotypus: ♀, Viechtach, Bayer. Wald/D, 8.71, W. Schwenke (ZSM). – Paratypus: 1♂, (ohne nähere Angaben) (ZSM).

M-Europa.

### 25. *Mesochorus sufflatus*, spec. nov.

**Beschreibung.** ♀: 5.5 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; unter jedem Fühler eine flache Grube; Mesopleuren dicht grob punktiert; Bohrer = Tarsus III, 1, stabförmig; Gesicht schwarz, mit roten Orbiten; Thorax schwarz; Mesoscutum mit roter H-Makel; Scutellum-Seiten rot; Stigma hyalin-braun; Coxa III oben verdunkelt; Tibia-III-Ende ¼ schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ¼ gelbrotem Endsaum; Tergit 3 hellrot, am Ende seitlich verdunkelt; folgende Tergite schwarzbraun.

**Typen.** Holotypus: ♀, Griesenau, Tirol/A, 700 m, 4.6.68, E. Haeselbarth (ZSM).

Ost-Alpen.

### 26. *Mesochorus lunarius*, spec. nov.

**Beschreibung.** ♀: 4 mm; Schläfe < Wangesbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Bohrer = Tarsus III, 1; Gesicht rot; Stirnseiten halbmondförmig weiß; Thorax rot, mit braunen Verdunklungen; Stigma hyalin; Tibia-III-Ende ⅕ geschwärzt; Stiel dunkelbraun, mit roter Basis und Spitze; Tergit 2 schwarzbraun, mit schmalem hellem Endband; folgende Tergite rot, mit dunklen Querbändern.

**Typen.** Holotypus: ♀, Sierra Morena/E, El Soldado, 23.7.26, Seyrig (Paris). – Paratypus: 1♀, dto (ohne Abdomen, Hinterbeine und rechten Vorderflügel).

Iberische Halbinsel.

### 27. *Mesochorus messaureus*, spec. nov.

**Beschreibung.** ♀: 5.0 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Stigma gleichschenklig; Bohrer < Tarsus III, 1, schmal, fast spitz; Gesicht rot; Thorax rot; Mesoscutum braun, mit gelber H-Makel; Basal-Hälfte des Metanotums braun; Stigma hell-graubraun; Tibia-III-Ende ⅕ geschwärzt; Tergit 1 dreifarbig: rot-braun-rot; Tergit 2 braun, mit 1/1 unscharfem rotem Dreieck; folgende Tergite rot + braun gebändert.

**Typen.** Holotypus: ♀, Messaure/S, 9.71, K. Müller (AEI).

Schweden.

### 28. *Mesochorus venerandus*, spec. nov.

**Beschreibung.** ♀: 7,6 mm; Schläfe > Augenbreite; Ocellus < Vertexbrücke; Stigma vergrößert; Flügelgeäder stark dunkel gefärbt; Bohrer = Tarsus III, 1, breit; Gesicht rot, mit weißen Orbiten, neben Fühlern dreieckig weiß; Thorax gelbrot, nur Mesoscutum-Makel und basale Hälfte des Metanotums braun; Stigma schwarzbraun; Tibia-III-Ende ¼ schwarz; Tergit 1 schwarz; Tergit 2 schwarz + ⅓ apikal gelb; ab Tergit 3 rot, mit dominanten braunen Verdunklungen.

**Typen.** Holotypus: ♀, Ochrid, S.H.S., Macedonia, 6.1835 (!), R. Wolfschläger (ZSM).

Balkan.

### 29. *Mesochorus dilobatus*, spec. nov.

**Beschreibung.** ♀, ♂: 3.0-3.2 mm; Schläfe < Augenbreite; Ocellus = Vertexbrücke; Stigma verbreitert; Bohrer < Tarsus III, 1, stabförmig; Griffel > Tarsus III, 2, dünn; Gesicht gelbrot, mit gelbweißen Orbiten; Stigma graubraun, mit hyalinen oberen Ecken; Tibia-III-Ende ⅕ geschwärzt; Tergit 1 schwarz, mit hellroter Basis; Tergit 2 schwarz, mit ⅓ gelbrotem Endsaum; Tergit 3: ½ gelbrot, ½ schwarzbraun; folgende Tergite schwarz.

**Typen.** Holotypus: ♀, Krailling/D, 6.52, Esch (ZSM). – Paratypen: 7♀♀, 2♂♂, Polen, J. Sawoniewicz (Warschau).

Ex *Diloba* (Noctuidae) via *Apanteles* (Braconidae) (Esch).
Deutschland, Polen.

### 30. *Mesochorus sternalis*, spec. nov.

**Beschreibung.** ♀: 6 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer ≥ Tarsus III, 1, sehr schmal; Gesicht rot, mit gelbweißen Orbiten; Thorax schwarz, Pro- und Mesosternum auffallend rot; Stigma schwarzbraun; Tibia-III-Ende ¼ geschwärzt; Tergit 1 schwarz; Tergit 2: ⅔ schwarz, ⅓ rötlich; Tergit 3 Mittelstreifen rot, Seiten schwärzlich; folgende Tergite braun.

**Typen.** Holotypus: ♀, Zwiesel, Bayer. Wald/D, 20.7.68, W. Schwenke (ZSM).

SE-Deutschland.

### 31. *Mesochorus pumilionis*, spec. nov.

**Beschreibung.** ♀: 3 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Stigma vergrößert; Bohrer = Tarsus III, 1, breit; Gesicht rot, leicht gebräunt; Thorax schwarz; Mesoscutum mit angedeuteter brauner H-Makel; Scutellum-Seiten braun; Stigma schwarzbraun; Tibia-III-Ende ¼ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit schmalem weißlichem Endsaum; Tergit 3 Mittelstreifen rot, seitlich braun; folgende Tergite rot, mit breiten braunen Querbändern.

**Typen.** Holotypus: ♀, Leicester/UK, 8.73, Jennifer Owen (AEI). – Paratypus: 1♀, dto.

England.

### 32. *Mesochorus bracatus*, spec. nov.

**Beschreibung.** ♀: 3.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Femur III verdickt; Bohrer = Tarsus III, 1, kurz, stabförmig; Gesicht rot, mit Verdunklungen; Thorax schwarz; Stigma hyalin-braun; Coxa III stark verdunkelt; Femur III verdunkelt; Tibia-III-Ende ⅕-¼ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit schmalem weißlichem Endsaum; Tergit 3 längs der Mitte rot, seitlich verdunkelt; ab Tergit 4 dunkelbraun.

**Typen.** Holotypus: ♀, Kerry Eire Beirne/Irland, 6.8.40 (leg. ?) (AEI).

Irland.

### 33. *Mesochorus olitorius*, spec. nov.

**Beschreibung.** ♀, ♂: 3.1-3.3 mm; Schläfe < (♀), = (♂) Augenbreite; Ocellus < Vertexbrücke; Stigma schmal; Bohrer > Tarsus III, 1, schlank, zur Spitze stark verjüngt; Griffel = Tarsus III, 2, dünn; Gesicht schwarz (♀) oder braun (♂), mit schmalen roten Orbiten; Thorax schwarz; Mesoscutum mit verschwommener H-Makel; Scutellum seitlich braun; ♂ Prothorax schwarz + rot; Stigma braun; Coxa III verdunkelt (♀), hell (♂); Tibia-III-Ende ¼ verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit ¼ gelbrotem Endsaum; Tergit 3 basal ¼ rotgelb; folgende Tergite braun-schwarz.

**Typen.** Holotypus: ♀, Apfelbach/D, 25.8.89, G. Peters (ZSM). – Paratypen: 5♂♂, dto.

Ex *Cerostoma xylostellum* (Plutellidae) (Pet.).
Deutschland.

### 34. *Mesochorus hortensis*, spec. nov.

**Beschreibung.** ♀, ♂: 4.3-5.1 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Stigma schmal; Bohrer = Tarsus III, 1, breit; Griffel ≤ Tarsus III, 2, stabförmig; Gesicht schwarz (♀) oder gebräunt (♂); Thorax schwarz; Mesoscutum mit schwacher brauner H-Makel; Scutellum-Seiten schwach braun; Stigma hyalin-braungrau; Tibia-III-Ende ⅕ unscharf geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ca. ⅒ weißlichem Endsaum; Tergit 3 rot, seitlich verdunkelt; folgende Tergite braun(-schwarz).

**Typen.** Holotypus: ♀, Reither-Alm, Bay./D, 850 m, 26.5.72, E. Haeselbarth (ZSM). – Paratypen: 7♀♀, 6♂♂, Polen, J. Sawoniewicz (Warschau); Österreich, M. Schwarz (Schwarz); Dessau/D, H. Zoerner (DEI).

Von *Vaccinium myrtillus* gekeschert (Haes.).
M-Europa.

### 35. *Mesochorus carinatus*, spec. nov.

**Beschreibung.** ♀: 4.2 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Gesichtsmitte mit erhöhtem Kiel; Bohrer = Tarsus III, 1; Gesicht lackschwarz, mit schmalen roten Orbiten; Frontal-Orbiten neben Fühlern auffällig zweiteilig weiß; Thorax schwarz; Stigma schwarzbraun; Tibia-III-Ende ⅒ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅒ weißem Endrand; Tergit 3 rot, mit seitlichen Verdunklungen; folgende Tergite braunschwarz.

**Typen.** Holotypus: ♀, Oxford/UK, 7.81, C 12, Denis Owen (AEI). – Paratypen: 2♀♀, dto.

England.

### 36. *Mesochorus insularis*, spec. nov.

**Beschreibung.** ♀, ♂: 3.5-4.1 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren schütter punktiert; Bohrer ≥ Tarsus III, 1, schmal, stark verjüngt; Griffel = Tarsus III, 2, stabförmig; Gesicht schwarz (♀), braun (♂), Orbiten schmal gelbrot; Thorax schwarz; Mesoscutum mit undeutlicher brauner H-Makel; Stigma schwarzbraun; Coxa III oben verdunkelt; Tibia-III-Ende ¼ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit sehr schmalem weißgelbem Endsaum; Tergit 3 schwarz, in der Mitte sanduhrförmig gelb; folgende Tergite gebändert.

**Typen.** Holotypus: ♀, Leicester/UK, 10.73, Jennifer Owen (AEI). – Paratypen: 265♀♀, 13♂♂, dto.

England.

### 37. *Mesochorus martinus*, spec. nov.

**Beschreibung.** ♀: 5.1 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer = Tarsus III, 1, schmal, am Ende stark verjüngt; Gesicht gebräunt; Thorax schwarz; Prothorax schwarz + rot; Mesopleuren oben rot, zum größten Teil schwarz; Mesoscutum mit brauner H-Makel; Scutellum-Seiten braun; Stigma schwarzbraun; Tibia-III-Ende ¼ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅛ rotem Endsaum; Tergit 3 rot, seitlich braun; folgende Tergite überwiegend braun.

**Typen.** Holotypus: ♀, Lutherstadt Wittenberg/D, 7.64, Lichtfalle, H. Zoerner (DEI).

M-Europa.

### 38. *Mesochorus aranealis*, spec. nov.

**Beschreibung.** ♀, ♂: 4.1-5.0 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Hinterbeine auffallend lang; Bohrer = Tarsus III, 1; Griffel = Tarsus III, 2; Gesicht rot, bräunlich verdunkelt; Thorax schwarz; bei ♂ Prothorax z.T. rot und Mesoscutum-Makel schwach braun; Stigma braun; Tibia-III-Ende ¼ schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅙-¼ rötlichem Endsaum; Tergit 3 rot, mit verdunkelten Seiten; folgende Tergite schwarz(-braun).

**Typen.** Holotypus: ♀, Warszawa/PL, 20.9.71, J. Sawoniewicz (Warschau). – Paratypen: 5♂♂, östl. Deutschland, H. Zoerner (DEI), 1♂, Polen, J. Sawoniewicz (Warschau).

Polen, Deutschland.

### 39. *Mesochorus iniquus*, spec. nov.

**Beschreibung.** ♀, ♂: 3.8-4.8 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Postpetiolus mit Rillen; Bohrer = Tarsus III, 1; Griffel = Tarsus III, 2, dünn; Gesicht schwarz, mit roten Orbiten (♀), rot + braun, mit gelben Orbiten (♂); Thorax schwarz, bei ♂ mit rotem Prothorax und brauner Mesoscutum-Makel; Stigma schwarzbraun; Femur III geschwärzt; Tibia-III-Ende ¼-⅓ schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅙-⅛ gelbrotem Endsaum; Tergit 3 Basalhälfte rotgelb, Apikalhälfte geschwärzt; folgende Tergite schwarz(-braun).

**Typen.** Holotypus: ♀, Retzbach, Main/D, 7.6.95, Baumgarten (Baumgarten). – Paratypen: 1♀, 2♂♂, dto.

Ex *Polyommatus* (Lycaenidae) via *Aleiodes* und *Cotesia* (Braconidae) (Bauer).
M-Europa.

### 40. *Mesochorus canaveseus*, spec. nov.

**Beschreibung.** ♀: 5.7 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren schütter punktiert; Postpetiolus apikal gerieft; Bohrer = Tarsus III, 1, am Ende kaum verdünnt; Gesicht schwarz, mit schmalen roten Orbiten; Thorax schwarz; Mesoscutum mit brauner H-Zeichnung; Scutellum-Seiten braun; Stigma schwarzbraun; Tibia-III-Ende ⅓ undeutlich geschwärzt; Tergit 1 schwarz; Tergit 2 rot, mit seitlichen Verdunklungen; ab Tergit 3 rot/braun gebändert.

**Typen.** Holotypus: ♀, Bienca Canavese, Piem./I, 400 m; 20.9.-19.10.85, A. Casale (Casale).

N-Italien.

### 41. *Mesochorus cacuminis*, spec. nov.

**Beschreibung.** ♀, ♂: 5.8-6 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Stigma schmal; Bohrer < Tarsus III, 1, schmal, fast spitz; Griffel = Tarsus, nach innen gebogen; Gesicht gebräunt; Thorax schwarz; Stigma hyalin-graubraun; Tibia-III-Ende ⅓ schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅛-⅒ weißgelbem Endrand; Tergit 3 rot, seitlich dunkel; folgende Tergite braunschwarz.

**Typen.** Holotypus: ♀, Brandenberg, Tir./A, 1.200-1.400 m, 20.6.84, E. Haeselbarth (ZSM). – Paratypus: 1♂, Freilassing/D; in Falle, *Picea abies*-Kultur mit starkem *Pristiphora*-(Tenthredinidae)-Befall.

S-Deutschland.

### 42. *Mesochorus gladiator*, spec. nov.

**Beschreibung.** ♀ 6.4 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Stigma vergößert; Bohrer sehr lang, > Tarsus III, 1, stabförmig; Gesicht schwarz, Orbiten rot; Thorax schwarz; Mesoscutum mit angedeuteter brauner H-Makel; Stigma braun; Coxa III stark verdunkelt; Tibia-III-Ende undeutlich ¼ verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅙ rotem Endband; Tergit 3: ½ rot, ½ schwarz; folgende Tergite gebändert.

**Typen.** Holotypus: ♀, Sonthofen, Obb./D, 7.9.85, W. Schwenke (ZSM).

Bayer. Alpen.

### 43. *Mesochorus gemellus* Holmgren

*Mesochorus gemellus* Holmgren, 1858: 123, ♀ ♂.
*Mesochorus tachypus* Holmgren, 1858: 130, ♀ ♂; **syn. nov.** (aus Vergleich *M. gemellus* Holmgren det. J. F. Aubert nach Lectotypus mit *M. tachypus* Holmgren, Beschreibung.
*Mesochorus brevicollis* Thomson, 1885: 340, ♀ ♂, **syn. nov.** nach Lectotypus.

**Diagnose.** ♀, ♂: 4.0-6.5 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren fast glatt; Bohrer ≥ Tarsus III, 1, breit stabförmig; Griffel > Tarsus III, 2, dünn; Gesicht schwarz (♀), braun (♂), mit schmalen weißlichen Orbiten, neben Fühlern dreieckig weiß; Thorax schwarz; Stigma mittel- bis dunkelbraun; Tibia-III-Ende 1/7-1/8 geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit 1/6 rötlichem Endsaum; Tergit 3 schwarz, mit rötlicher Lasche (♀) oder ganz rot (♂); folgende schwarz(-braun).

**Typen.** Lectotypus: ♀, Aubert 1966 (Stockholm). – *M. brevicollis* Thomson: Lectotypus: ♀, Schwenke 1968 (UZI Lund).

Ex *Pieris* (Pieridae) (Zah.); ex *Malacosoma* (Lasiocampidae) (Cap.); ex *Cidaria* (Geometridae) (Hz.); ex *Larentia* (Geometridae) via Campopleginae (Hz.).
Fundorte in allen Teilen Europas.
Europa.

### 44. *Mesochorus piemontensis*, spec. nov.

**Beschreibung.** ♀: 4.2 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer = Tarsus III, 1; Gesicht schwarz, Orbiten rot; Thorax schwarz, mit undeutlicher brauner H-Makel auf Mesoscutum; Scutellum-Seiten braun; Stigma hyalin-braun; Coxa III geschwärzt; Tibia-III-Ende 1/5 geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit schmalem weißlichem Endsaum; Tergit 3 rot, Seiten verdunkelt; ab Tergit 4 gebändert.

**Typen.** Holotypus: ♀, Valdieri, Piem./I, 980 m; 9.-11.86, G. Della Beffa (AEI).

N-Italien.

### 45. *Mesochorus ovimaculatus*, spec. nov.

**Beschreibung.** ♀, ♂: 3.3-4 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer = Tarsus III, 1; Griffel = Tarsus III, 2; Gesicht rot, leicht gebräunt oder gefleckt; Thorax schwarz; Mesoscutum mit undeutlicher brauner H-Makel; Scutellum seitlich braun; Stigma graubraun; Tibia-III-Ende 1/5 geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit 1/8-1/10 hellem Endband; Tergit 3 rot, seitlich verdunkelt; folgende Tergite schwarz; bei ♀ letztes und vorletztes Tergit mit auffallendem gelbem eiförmigem Fleck.

**Typen.** Holotypus: ♀, Dessau/D, 5,3 km S, Auwald, 26.8.85, Nr. 220/85, H. Zoerner (DEI). – Paratypen: 5♀♀, 4♂♂, Dessau Umgeb., Dübener Heide, H. Zoerner (DEI).

M-Europa.

### 46. *Mesochorus pullus*, spec. nov.

**Beschreibung.** ♀: 4.2 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Postpetiolus mit feinen Rippen; Bohrer = Tarsus III, 1, schmal, am Ende verjüngt und etwas aufgebogen; Gesicht schwarz, mit roten Orbiten; Thorax schwarz; Stigma schwarzbraun; Tibia-III-Ende 1/4-1/3 schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit 1/6 rotem Endsaum; Tergite 3 + 4 rot, seitlich verdunkelt; ab Tergit 5 überwiegend braun.

**Typen.** Holotypus: ♀, Bienca Canavese, To., Piem./I, 400 m, 7.85, A. Casale (Casale).

N-Italien.

### 47. *Mesochorus terebratus* , spec. nov.

**Beschreibung.** ♀, ♂: 5.2-5.8 mm; Schläfe = (♀), < (♂) Augenbreite; Ocellus < Vertexbrücke; Stigma etwas vergrößert; Bohrer sehr lang und dick, viel > Tarsus III, 1, leicht nach unten gebogen; Griffel >

Tarsus III, 2, dünn; Gesicht schwarz, mit breiten roten Orbiten, bei ♂ nur gebräunt; Stigma dunkel- bis schwarzbraun, obere Ecken hyalin; Coxa III stark verdunkelt; Tibia III 1/7-1/8 verdunkelt; Thorax schwarz; Tergit 1 schwarz; Tergit 2 schwarz, mit 1/6 rötlichem Endsaum; Tergit 3 schwarz, mit 1/6 rötlichem Basalsaum, in der Mitte laschenförmig erweitert; ab Tergit 4 schwarz(-braun).

**Typen.** Holotypus: ♀, Zigana-Paß/Türkei, E 393100/N 404100, 24.7.73, R. Hinz (ZSM). – Paratypen: 2♀♀, Dessau/D, H. Zoerner (DEI), Salzburg/A, R. Hinz (ZSM); 3♂♂, Dessau/D, H. Zoerner (DEI); Salzburg/A, R. Hinz (ZSM); Zwettl/Ober-Österr., M. Schwarz (Schwarz).

M- und SE-Europa, Türkei.

### 48. *Mesochorus pectinipes* Bridgman

*Mesochorus pectinipes* Bridgman, 1883: 166, ♂.

**Diagnose.** ♀, ♂: 5.3-6.3 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren ♀ relativ stark punktiert; Scutellum ♀ ♂, seitlich betrachtet, mit kleiner waagrechter Spitze; Klauen lang und dicht gekämmt; Bohrer sehr groß und breit, > Tarsus III, 1, etwas nach unten gebogen; Griffel etwas > Tarsus III, 2, dünn; Gesicht rot, ± stark gebräunt; Thorax schwarz, Mesoscutum mit undeutlicher brauner H-Makel, oben trüb-hyalin, unten (größerer Teil) graubraun; Coxa III stark gebräunt; Tibia-III-Ende unscharf schmal verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit 1/6-1/8 rotem Endsaum; Tergit 3 braun, in der Mitte sanduhrförmig gelb; folgende Tergite überwiegend braun.

**Typen.** Holotypus: ♂, Norwich, Bridgman, 5.82 (Norwich).

Fundorte (♀♀ neu, ♂♂) in Polen, England, Deutschland und Österreich.
M- und W-Europa.

### 49. *Mesochorus amnicolaris*, spec. nov.

**Beschreibung.** ♀, ♂: 2.8-3.1 mm; Schläfe = (♂), < (♀) Augenbreite; Ocellus < Vertexbrücke; Bohrer ≥ Tarsus III, 1, stabförmig, verjüngt; Griffel < Tarsus III, 2, klobig; Gesicht gelb, mit weißen Orbiten (♀), etwas bräunlich (♂); Thorax schwarz; Stigma hyalin-graubraun; Coxa III verdunkelt; Tibia-III-Ende schmal undeutlich verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit 1/8-1/10 gelbrotem Endsaum; Tergit 3 schwarz, mit 1/8-1/10 gelbrotem Basalsaum, in Mitte verbreitert; folgende Tergite schwarz.

**Typen.** Holotypus: ♀, Sebnitz/ČSFR, 9 km N, 8.8.93, Nr. 283/93, H. Zoerner (DEI). – Paratypen: 5♀♀, 13♂♂, Oppach, Thür./D, Dessau/D, H. Zoerner (DEI).

M-Europa.

### 50. *Mesochorus mülleri*, spec. nov.

**Beschreibung.** ♀: 4.0 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren stark punktiert; Bohrer > Tarsus III, 1, schmal, stark verjüngt, fast spitz; Gesicht leicht gebräunt, mit gelben Orbiten, neben Fühlern dreieckig weiß; Thorax schwarz; Stigma schwarzbraun; Tibia-III-Ende undeutlich schmal verdunkelt; Tergit 1 schwarz, mit hellroter Basis; Tergit 2 schwarz, mit 1/4 gelbrotem Endsaum; ab Tergit 3 hellbraun/dunkelbraun (dominierend) gebräunt.

**Typen.** Holotypus: ♀, Messaure/S, 28.7.72, K. Müller (AEI).

Schweden.

### 51. *Mesochorus horstmanni*, spec. nov.

**Beschreibung.** ♀, ♂: 6.4-6.6 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Mesopleuren relativ stark punktiert; Bohrer > Tarsus III, 1, breit; Griffel etwas > Tarsus III, 2, dünn; Gesicht gebräunt bis geschwärzt, mit breiten roten Orbiten; Thorax schwarz; Mesoscutum mit brauner H-Makel; Scutellum-Seiten braun; Coxa III stark verdunkelt; Tibia-III-Ende ⅕ undeutlich geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit sehr schmalem rötlichem Endsaum; Tergit 3 rot, mit seitlichen Verdunklungen, folgende Tergite schwarz(-braun), mit dunkelroten Mittelteilen.

**Typen.** Holotypus: ♀, Mellum, Nordsee-Insel/D, FS8/G, 3.5.-7.6.86, V. Haeseler (Horstmann)). – Paratypen: 3♀♀, 1♂, dto.

N-Deutschland.

### 52. *Mesochorus inflatus*, spec. nov.

**Beschreibung.** ♀: 3.3 mm; Schläfe > Augenbreite; Ocellus < Vertexbrücke; Stigma verbreitert, die zwei Schenkel wie 1 : 1; Bohrer > Tarsus III, 1, schmal; Gesicht gelbrot, mit weißlichen Orbiten, neben Fühlern mit weißem Dreieck; Prothorax rot, Meso- und Metathorax schwarz; Mesoscutum mit brauner H-Makel; Scutellum braun; Mesopleuren braunschwarz und rot; Stigma schwarzbraun; Tibia-III-Ende schmal verdunkelt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅙ gelbem Endsaum; Tergit 3 rot, Seiten schwarzbraun; folgende Tergite rot, mit breiten braunen Basalbändern.

**Typen.** Holotypus: ♀, Messaure/S, 22.7.72, K. Müller (AEI).

Schweden.

### 53. *Mesochorus meridionator* Aubert

*Mesochorus meridionator* Aubert, 1969: 69, ♀.

**Diagnose.** ♀: 3.2-3.6 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer > Tarsus III, 1; Gesicht rot, mit weißen Orbiten, neben Augen dreieckig weiß; Thorax gelbrot; Mesoscutum und Scutellum mit undeutlichen braunen Wischen; Metanotum dunkelbraun; Stigma rotbraun; Tibia-III-Ende ⅙ geschwärzt; Tergit 1 schwarz, mit dunkelroter Basis und gelbrotem Endsaum; Tergit 2 schwarz, mit ⅐ rotem Endsaum; Tergit 3 rot, seitlich etwas verdunkelt; folgende Tergite überwiegend dunkelbraun.

**Typen.** Holotypus ♀, La Mole/F, 8.61 J. F. Aubert (Aubert).

Fundorte in Südfrankreich, Spanien und N-Afrika.
SW-Europa.

### 54. *Mesochorus pascuus*, spec. nov.

**Beschreibung.** ♀, ♂: 4.2-4.7 mm; Schläfe > (♀), = (♂) Augenbreite; Ocellus < Vertexbrücke; Bohrer < Tarsus III, 1, parallelseitig, am Ende etwas aufgebogen; Griffel = Tarsus III, 2, stabförmig; Gesicht ♀ geschwärzt, mit roten Orbiten, ♂ gebräunt, mit weißen Orbiten, bei ♂ neben Fühlern dreieckig weiß; Thorax ♀ schwarz; ♂ Oberseite schwarz, Seite schwarz und rot gefleckt; ♂ Mesoscutum mit flächiger rotgelber H-Makel, Scutellum-Seiten rot; Stigma ♀ dunkelbraun, ♂ heller braun; Tibia-III-Ende ♀ ⅔, ♂ ¼ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅕ (♀), ⅛ (♂) rotgelbem Endsaum; Tergit 3 rot, seitlich schwarzbraun; ab Tergit 4 mit breiten schwarzbraunen/schmalen roten Bändern.

**Typen.** Holotypus: ♀, Insterberg, Tir./A, 1.250 m, 25.6.83, E. Haeselbarth (ZSM). – Paratypus: 1♂, dto.

N-Alpen.

**55. *Mesochorus zwettleus*, spec. nov.**

**Beschreibung.** ♀: 4.2 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Bohrer < Tarsus III, 1, bauchig; Gesicht schwarz, mit roten Orbiten; Thorax schwarz; Stigma hyalin-graubraun; Tibia-III-Ende ¼ geschwärzt; Tergit 1 schwarz, Tergit 2 schwarz, mit ⅕ rötlichem Endsaum; Tergit 3 rot, seitlich geschwärzt; folgende Tergite schwarzbraun.

**Typen.** Holotypus: ♀, Langzwettl bei Zwettl/Ober-Österr., 24.6.88, M. Schwarz (Schwarz).

Österreich.

**56. *Mesochorus chasseralis*, spec. nov.**

**Beschreibung.** ♀: 6.5-6.7 mm; Schläfe > Augenbreite; Ocellus < Vertexbrücke; Gesicht gewölbt; Mesopleuren dicht fein punktiert; Bohrer < Tarsus III, 1, schmal; Gesicht schwarz, mit roten Orbiten; Thorax schwarz; Stigma grau- bis schwarzbraun; Coxa III verdunkelt; Tibia-III-Ende ⅕-¼ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ca. 1/12 gelblichem Endsaum; Tergit 3 rot, seitlich geschwärzt; folgende Tergite schwarz(-braun).

**Typen.** Holotypus: ♀, Chasseral/CH, 28.7.9⅙.4.92, R. Hinz (ZSM). – Paratypen: 3♀♀, dto.

Ex *Rhabdinoina* (Tenthr.) (Hz.).
Schweizer Alpen.

**57. *Mesochorus oxfordensis*, spec. nov.**

**Beschreibung.** ♀: 4 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Bohrer = Tarsus III, 1, breit; Gesicht schwarz, mit schmalen roten Orbiten; Thorax schwarz; Stigma schwarzbraun; Coxa III verdunkelt; Tibia-III-Ende ⅕ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit schmalem gelbweißem Endsaum; ab Tergit 3 schwarzbraun, je Segment mit einem umgekehrten roten Dreieck.

**Typen.** Holotypus:♀, Oxford/UK, 7.81, Denis Owen (AEI).

England.

**58. *Mesochorus pyramideus*, spec. nov.**

**Beschreibung.** ♀: 4.3 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer = Tarsus III, 1, schmal, am Ende etwas aufgebogen; Gesicht rot, mit gelbroten Orbiten; Thorax schwarz; Mesoscutum mit undeutlicher brauner H-Makel; Stigma graubraun; Tibia-III-Ende ¼ schwarz; Coxa III leicht gebräunt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅓ gelbem apikalem Dreieck; Tergit 3 schwarz, mit gelber Mittellasche bis 4/5 der Länge; ab Tergit 4 rot/dunkelbraun gebändert.

**Typen.** Holotypus: ♀, Skåne/S, Falle 4, 7.69, Bo Svensson (AEI).

Schweden.

**59. *Mesochorus solus*, spec. nov.**

**Beschreibung.** ♀: 4 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Bohrer = Tarsus III, 1; Gesicht rot, gebräunt; Thorax schwarz; Stigma graubraun; Tibia-III-Ende ¼ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅛ gelbweißem Endsaum; Tergit 3 längs der Mitte rot, seitlich schwarz; folgende Tergite schwarzbraun gebändert.

**Typen.** Holotypus: ♀, Dessau/D, 1,7 km NW, 29.9.93, Nr. 395/93, H. Zoerner (DEI); Kopf gesondert geklebt.

M-Deutschland

### 60. *Mesochorus tenuigenae*, spec. nov.

**Beschreibung.** ♀, ♂: 5-6 mm; Schläfe < Augenbreite; Ocellus ≥ Vertexbrücke; Bohrer < Tarsus III, 1, am Ende etwas aufgebogen; Griffel = Tarsus III, 2, dünn; Gesicht gebräunt, mit schmalen gelbroten Orbiten; Thorax rot; Meso- und Metathorax-Oberseite schwarz; Mesoscutum mit roter H-Makel; Scutellum seitlich rot; Stigma dunkelbraun; Tibia-III-Ende ¼ geschwärzt; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅙-⅛ gelbrotem Endsaum; Tergit 3 längs der Mitte rot, Seiten schwarz; folgende Tergite schwarz(-braun).

**Typen.** Holotypus: ♀, Sirnitz/A, 9.7.82, E 135730/N 465100, R. Hinz (ZSM). – Paratypen: 1♂, dto; 7♀♀, 3♂♂, Österreich, E. Haeselbarth (ZSM); N-Italien, A. Scaramozzino (Scaramozzino); Französ. Alpen, R. Hinz (ZSM).

Alpen.

### 61. *Mesochorus pectoralis* Ratzeburg

*Mesochorus pectoralis* Ratzeburg, 1844: 1, 149, ♀ ♂.
*Meoschorus stigmaticus* Brischke, 1880: 183, ♀ ♂; syn. Schmiedeknecht 1910: 1994.

**Diagnose.** ♀, ♂: 4.1-6.1 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Bohrer = Tarsus III, 1, schmal, am Ende stark verjüngt; Griffel = Tarsus III, 2, dünn; Gesicht schwarz (♀), verdunkelt (♂), mit gelbroten Orbiten; neben Fühlern dreieckig weiß; Thorax schwarz; ♂ Prothorax partiell rot; Mesoscutum mit ± deutlicher brauner H-Makel; Scutellum seitlich undeutlich braun; Stigma heller oder dunkler braun; Coxa III verdunkelt bis schwarz; Tibia-III-Ende ¼ schwarz; Tergit 1 schwarz; Tergit 2 mit ⅙-⅛ rötlichem Endsaum; Tergit 3 überwiegend rot, an den Seiten verdunkelt; ab Tergit 4 überwiegend schwarz(-braun), selten überwiegend rot (s. *declinans*-Gr.).

**Typen.** Verschollen.

Ex Noctuidae, Geometridae, Plutellidae via Braconidae (Hz., Pet., Schw.).
In allen Teilen Europas nachgewiesen.
Europa.

### 62. *Mesochorus diluvius*, spec. nov.

**Beschreibung.** ♀, ♂: 4.0-4.5 mm; Schläfe £ Augenbreite; Ocellus < Vertexbrücke; Bohrer < Tarsus III, 1, schmal; Griffel = Tarsus III, 2; Gesicht ♀ stärker, ♂ schwacher geschwärzt, mit roten Orbiten; Thorax schwarz; ♂ Prothorax rot; Mesoscutum ♂ mit schwacher brauner H-Makel; Stigma graubraun; Tibia-III-Ende ⅙ geschwärzt; Tergit 1 schwarz; Tergite 2 schwarz, mit ⅙-⅛ gelbrotem Endsaum; Tergit 3 gelbrot, mit braunen Seiten; folgende Tergite schmal-rot/breit-braun gebändert.

**Typen.** Holotypus: ♀, Köthen/D, 19.5.88, Nr. 46/88, H. Zoerner (DEI). – Paratypen: 1♂, Dessau/D, Nr. 110/87; 1♀, Löbau/D, Nr. 298/93, H. Zoerner (DEI); 1♀, Polen, Nr. 371 (Warschau).

E-Deutschland, Polen.

### 63. *Mesochorus versuranus*, spec. nov.

**Beschreibung.** ♀: 4.8 mm; Schläfe > Augenbreite; Ocellus < Vertexbrücke; Mesopleuren relativ stark punktiert; Postpetiolus mit Rillen; Bohrer < Tarsus III, 1; Gesicht schwarz, mit roten Orbiten; Thorax schwarz; Stigma hell graubraun, mit hyalinen oberen Ecken; Coxa III gebräunt; Tibia-III-Ende hell; Tergit 1 schwarz; Tergit 2 schwarz, mit ⅕ rotem Endsaum; folgende Tergite rot/braun gebändert.

**Typen.** Holotypus: ♀, Partschins, Südtirol/I, 1.000 m, 31.8.67, E. Haeselbarth (ZSM).

Ital. Alpen.

### 64. *Mesochorus gravis*, spec. nov.

**Beschreibung.** ♂: 4.7 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Mesopleuren ziemlich stark punktiert; Stigma verbreitert; Postpetiolus mit Rillen; Griffel > Tarsus III, 2, stabförmig, gleich breit; Gesicht gebräunt, Orbiten weiß, neben Fühlern breit dreieckig weiß; Pro- und Mesothorax rot; Mesoscutum braun, mit gelber H-Makel; Scutellum seitlich rot; Metanotum schwarzbraun, Metapleuren dunkelrot; Stigma schwarzbraun, mit hellen oberen Ecken; Tibia-III-Ende schmal, unscharf verdunkelt; Abdomen schwarzbraun; Tergit 1 apikal rötlich; Tergit 2 mit ⅓ gelbem Endsaum; Tergit 3 basal ¾ gelbrot; folgende Tergite mit undeutlichen breiten rötlichen Endsäumen.

**Typen.** Holotypus: ♂, Dessau/D, 2,2 km SE, Nr. 130/92, H. Zoerner (DEI).

M-Deutschland.

### 65. *Mesochorus gardanus*, spec. nov.

**Beschreibung.** ♂: 3.1 mm; Schläfe < Augenbreite; Ocellus < Vertexbrücke; Stigma verbreitert und gleichschenklig; Griffel kurz stabförmig, = Tarsus III, 2, gleich breit; Gesicht und Prothorax gelbweiß; Mesothorax braunschwarz, Mesopleuren gelbrot, Mesoscutum mit roter H-Makel; Scutellum seitlich braun; Metathorax schwarzbraun, Absturz und Metapleuren rot; Beine weiß; Tergit 1 schwarzbraun; Tergit 2 schwarzbraun, mit ¼ gelbweißem Endsaum; Tergit 3 längs Mitte breit gelbweiß, Seiten verdunkelt; Tergite 4 und folgende: Basalhälfte braun, Apikalhälfte rot.

**Typen.** Holotypus: ♂, Garda Rocca/I, 100-250 m, 20.5.83, E. Haeselbarth (ZSM).

N-Italien.

### 66. *Mesochorus giaglioneus*, spec. nov.

**Beschreibung.** ♂: 3.5 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Postpetiolus mit Mittelfurche und einigen Rillen; Griffel etwas > Tarsus III, 2, am Ende leicht verbreitert; Gesicht schwarz, mit roten Orbiten; Thorax schwarz; Stigma graubraun; Coxa III geschwärzt; Tibia-III-Ende ¼-⅓ geschwärzt; Abdomen schwarz; Tergit 2 mit sehr schmalem weißem Endsaum; Tergit 3 schwarz, mit sanduhrförmiger weißer Zeichnung; ab Tergit 4 schwarzbraun.

**Typen.** Holotypus: ♂, Giaglione/I, To., 630 m, 8/9.88 R. Bassi (Bassi).

N-Italien.

### 67. *Mesochorus dilleri*, spec. nov.

**Beschreibung.** ♂: 8.0 mm; Schläfe = Augenbreite; Ocellus < Vertexbrücke; Gesicht quer, mit nach vorn divergierenden Augenrändern; Mesopleuren stark punktiert; Nervulus praefurkal; Areola-Nerv a1 kaum sichtbar; Postpetiolus mit Längsrillen; Griffel = Tarsus III, 2, dünn stabförmig; Gesicht-Mitte rot, seitlich mit sehr breiten weißen Orbiten; Thorax rot, mit 3 braunen Wischen auf Mesoscutum; Stigma hyalin; Tibia-III-Ende schmal verdunkelt; Abdomen schwarz; Tergit-2-Ende sehr schmal weißlich; Tergit 3 zu ⅔ rot.

**Typen.** Holotypus: ♂, Korsika, Furiani-Tal, Kulturland, 250 m, 4.5.61, E. Diller (ZSM).

Korsika.

**Bestimmungstabelle der ♂♂ mit Rotfärbung im mittleren oder/und hinteren Abdomen**

Gruppen: *angustatus* (partiell) (a), *declinans* (d) und *pectoralis* (p)
(Farbliche Unterscheidungen lassen bei diesen ♂♂ keine Gruppen-Bestimmungsschlüssel zu)

1(6) Griffel nadelspitz

2(3) Stigma hellbraun ... d 32. *acutus*, spec. nov. (S. 91)

3(2) Stigma hyalin

4(5) Petiolus-Basis schwarz ... p 15. *tenuiscapus* Thomson (S. 102)

5(4) Petiolus-Basis rot ... p 8. *versicolor*, spec. nov. (S. 100)

6(1) Griffel-Ende stumpf

7(36) Stigma (überwiegend) hyalin

8(29) Petiolus-Basis schwarz

9(10) Unterer Mandibelzahn > oberer ... d 7. *vitticollis* Holmgren (S. 84)

10(9) Beide Mandibelzähne gleich

11(12) Länge ≤ 3 mm ... p 3. *rapae*, spec. nov. (S. 99)

12(11) Länge ≥ 4 mm

13(20) Mesopleuren stark punktiert

14(15) Tergite 1 + 2 lang und schmal ... d 5. *aquilonis*, spec. nov. (S. 84)

15(14) Tergite 1 +2 kürzer und breiter

16(17) [Klauen gekämmt (Indiv. mit roter Abd.-Mitte) ... a 7. *giberius*, spec. nov.] (S. 75)

17(16) Klauen glatt

18(19) Länge 8 mm; Nervulus praefurkal ... p 67.*dilleri*, spec. nov. (S. 114)

19(18) 5-6 mm; Nervulus interstitial ... a 20. *angustatus* Thomson (S. 78)

20(13) Mesopleuren (fast) glatt

21(26) Mesopleuren schwarz

22(23) Griffel-Ende verdickt ... d 12. *castellanus*, spec. nov. (S. 86)

23(22) Griffel-Ende unverdickt

24(25) Gesicht geschwärzt ... d 46. *schwarzi*, spec. nov. (S. 94)

25(24) Gesicht gelbweiß ... d 8. *globulator*, spec. nov. (S. 85)

26(21) Mesopleuren rot

27(28) Griffel = Tarsus III, 2 ... p 10. *bicolor*, spec. nov. (S. 101)

28(27) Griffel > Tarsus III, 2 ... d 13. *pallipes* Brischke (S. 86)

29(8) Petiolus-Basis rot

30(31) Ocellus > Vertex-Brücke ... d 3. *pharaonis*, spec. nov. (S. 83)

31(30) Ocellus < Vertex-Brücke

32(33) Griffel spatelförmig ... p 5. *provocator* Aubert (S. 100)

33(32) Griffel stabförmig

34(35) Meso- und Metathorax braun(-rot) ........ p 18. *subfuscus*, spec. nov. (S. 103)

35(34) Meso- und Metathorax schwarz ........ d 10. *lacus*, spec. nov. (S. 85)

36(7) Stigma heller oder dunkler braun

37(68) Tibia-III-Ende schmal (max. 1/7) verdunkelt

38(51) Gesicht hell

39(42) Petiolus-Basis rot

40(41) Augenränder nach vorn divergierend ........ d 15.*dimidiator* Aubert (S. 86)

41(40) Augenränder parallel ........ p 65. *gardanus*, spec. nov. (S. 86)

42(39) Petiolus-Basis schwarz

43(44) Unterer Mandibelzahn > oberer ........ d 45. *testaceus* Gravenhorst (S. 94)

44(43) Beide Mandibelzähne gleich

45(46) Mesopleuren rot ........ d 18. *columbinus*, spec. nov. (S. 87)

46(45) Mesopleuren (überwiegend) schwarz

47(48) Stigma dunkelbraun ........ d 41. *rufoniger* Brischke (S. 93)

48(47) Stigma hellbraun

49(50) Länge > 5 mm ........ d 42. *doleri*, spec. nov. (S. 93)

50(49) Länge < 3 mm ........ d 47. *minutulus*, spec. nov. (S. 95)

51(38) Gesicht verdunkelt

52(59) Neben Fühlern dreieckig weiß

53(54) Tergit-2-Ende 1/12 weiß ........ p 49. *amnicolaris*, spec. nov. (S. 110)

54(53) Tergit-2-Ende 1/3-1/7 rot

55(54) Griffel zum Ende dünner ........ p 43. *gemellus* Holmgren (S. 108)

56(55) Griffel-Ende nicht verdünnt

57(58) Mesopleuren rot ........ p 64. *gravis*, spec. nov. (S. 114)

58(57) Mesopleuren schwarz ........ a 21. *caliginosus*, spec. (S. 78)

59(52) Neben Fühlern nicht dreieckig weiß

60(67) Mesopleuren (fast) glatt

61(62) Stigma verbreitert ........ p 47. *terebratus*, spec. nov. (S. 109)

62(61) Stigma normal

63(64) Klauen gekämmt ........ p 48. *pectinipes* Bridgman (S. 110)

64(63) Klauen nicht gekämmt

65(66) Ocellus > Vertexbrücke ........ d 40. *artus*, spec. nov. (S. 93)

66(65) Ocellus < Vertexbrücke ........ p 62. *diluvius*, spec. nov. (S. 113)

67(60) Mesopleuren stark punktiert ........ p 51. *horstmanni*, spec. nov. (S. 111)

68(37) Tibia-III-Ende breit (min. 1/6) verdunkelt

69(90) Gesicht hell (weiß, gelb, rot), ungefleckt

70(71) Schläfe > Augenbreite ........ p 22. *superbus*, spec. nov. (S. 104)

71(70) Schläfe ≤ Augenbreite

72(73) Tibia-III-Ende > ⅓ verdunkelt ........ d 28. *declinans* Habermehl (S. 90)

73(72) Tibia-III-Ende max. ⅓ verdunkelt

74(79) Griffel = Tarsus III, 2

75(78) Schläfe < Augenbreite

76(77) Länge ~3 mm; Postpetiolus glatt ........ p 29. *dilobatus*, spec. nov. (S. 105)

77(76) Länge ~5 mm; Postpetiolus gerieft ........ d 35. *skaneus*, spec. nov. (S. 92)

78(75) Schläfe = Augenbreite ........ d 24. *tenthredinidis*, spec. nov. (S. 89)

79(74) Griffel > Tarsus III, 2

80(83) Petiolus-Basis rot

81(82) Mesopleuren rot; neben Fühlern dreieckig weiß ........ d 19. *confusus* Holmgren (S. 87)

82(81) Mesopleuren rot + schwarz; neben Fühlern anders gefärbt . d 25. *slawicus*, spec. nov. (S. 89)

83(80) Petiolus-Basis schwarz

84(85) Mesopleuren schwarz ........ d 30. *semirufus* Holmgren (S. 90)

85(84) Mesopleuren rot oder rot + schwarz

86(87) Tibia-III-Ende ⅓ geschwärzt ........ a 16. *tetricus* Holmgren (S. 77)

87(86) Tibia-III-Ende ⅕ geschwärzt

88(89) Tergit-2-Ende ca. 1/16 weiß ........ d 39. *anglicus*, spec. nov. (S. 93)

89(88) Tergit-2-Ende ¼-⅓ rot ........ d 36. *vittator* Zetterstedt (S. 92)

90(69) Gesicht verdunkelt oder gefleckt

91(92) Mesopleuren rot + braun ........ d 21. *valdierius*, spec. nov. (S. 88)

92(91) Mesopleuren schwarz oder schwarz + rot

93(94) Griffel > Tarsus III, 2; Stigma verbreitert; Area postica sehr groß ........ a 15. *curvicaudus* Thomson (S. 77)

94(93) Die 3 Merkmale nicht zusammen

95(106) Schläfe = Augenbreite

96(99) Tergit-2-Endrand breit gelbrot

97(98) Länge 3.2 mm; Ocellus = Vertexbrücke ........ p 33. *olitorius*, spec. nov. (S. 106)

98(97) Länge 4.8 mm; Ocellus < Vertexbrücke ........ a 25. *kirunae*, spec. nov. (S. 79)

99(96) Tergit-2-Endrand sehr schmal weiß

100(101) Stigma verbreitert ........ p 23. *arduus*, spec. nov. (S. 104)

101(100) Stigma normal

102(103) Postpetiolus glatt ........ p 54. *pascuus*, spec. nov. (S. 111)

103(102) Postpetiolus längs gefurcht

104(105) Gesicht braun gefleckt ........ p 24. *bellus*, spec. nov. (S. 104)

105(104) Gesicht schwarz ........ p 66. *giaglioneus*, spec. nov. (S. 114)

106(95) Schläfe < Augenbreite

107(108) Tergite 2 + 3 sehr lang und schmal ........ a 26. *rupesus*, spec. nov. (S. 79)

108(107) Tergite 2 + 3 kürzer und breiter

109(110) Ocellus > Vertexbrücke ........ p 60. *tenuigenae*, spec. nov. (S. 113)

110(109) Ocellus ≤ Vertexbrücke

111(112) Schläfe = Augenbreite ........ p 34. *hortensis*, spec. nov. (S. 106)

112(111) Schläfe < Augenbreite

113(122) Mesopleuren schwarz

114(115) Stigma hyalin-braun ........ p 45. *ovimaculatus*, spec. nov. (S. 109)

115(114) Stigma (dunkel)braun

116(117) Neben Fühlern dreieckig weiß ........ p 61. *pectoralis* Ratzeburg (S. 113)

117(116) Neben Fühlern rot

118(121) Postpetiolus ohne Längsrillen

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